

Final Submittal

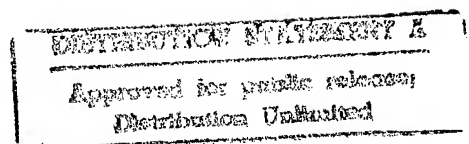
**Energy Engineering Analysis Program
Lighting Survey of Selected Buildings
Pine Bluff Arsenal
Pine Bluff, Arkansas**



Executive Summary

**Contract No. DACA01-94-D-0038
Delivery Order No. 0001**

June 1995



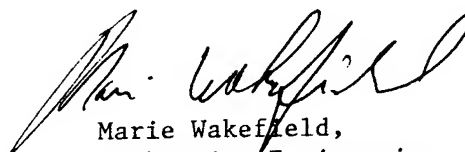


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FINAL SUBMITTAL

ENERGY ENGINEERING ANALYSIS PROGRAM
LIGHTING SURVEY OF SELECTED BUILDINGS
PINE BLUFF ARSENAL
PINE BLUFF, ARKANSAS

EXECUTIVE SUMMARY

CONTRACT NO. DACA01-94-D-0038
DELIVERY ORDER NO. 0001

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
LITTLE ROCK, ARKANSAS

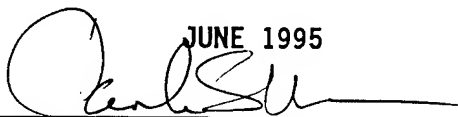
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PROJECT NO. 6941331001

JUNE 1995



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1.0 INTRODUCTION

1.1 Authorization

The Energy Engineering Analysis Program (EEAP), Lighting Survey of Selected Buildings at Pine Bluff, Arsenal, was authorized by the U.S. Army, Little Rock District, Corps of Engineers, under Contract Number DACA01-94-D-0038. Delivery Order Number 0001, dated 29 September 1994.

1.2 Objectives

The objectives of this Delivery Order (D.O.) are as follows:

- A. Perform a site survey of 45 buildings selected by Arsenal personnel. The purpose of the site survey is to gather sufficient data to permit evaluation of possible Energy Conservation Opportunities (ECOs).
- B. Evaluate possible and new ECOs.
- C. Combine ECOs into recommended projects.
- D. Prepare a comprehensive report to document the work performed, the results and the recommendations. The final report is to contain funds programming documentation.

1.3 Work Accomplished

The initial field survey of the Arsenal was performed from 15 November 1994 through 18 November 1994. During that time, a team of four engineers from Reynolds, Smith and Hills, Inc. (RS&H) performed tests, made observations and conducted interviews with installation personnel.

An additional field survey was conducted on 9 December 1994 through 11 December 1994.

1.4 Summary of Results

The 16 ECO evaluations that were required by the Scope of Work (SOW) were combined into eight separate evaluations. Of the eight combined evaluations, three are recommended for design and construction, based on life-cycle-cost analysis (LCC). The recommended projects are:

ECO - 1 Upgrade or replace lighting
ECO - 4 Install occupancy sensors
ECO - 8 LED exit signs

Combination of the three projects into one funding package will qualify the projects for ECIP funds.

When constructed, it is estimated that the projects will save the Arsenal approximately 3,135 MBtu in annual electricity use resulting in an annual cost savings of \$63,000, based on present-day electricity rates and hours of building occupancies. The combined projects have an SIR of 2.0 and a simple payback of 5.9 years.

Percent reductions in overall electricity use and cost at the Arsenal are 3.6 percent and 4.4 percent, respectively.

It terms of electricity demand and use for lighting in the 45 buildings surveyed, a 52-percent reduction is projected to be realized.

2.0 BUILDING DATA

2.1 Installation Description

Pine Bluff Arsenal, located in Pine Bluff, Arkansas, is an installation of the Armament, Munitions and Chemical Command. The Arsenal is a government-owned, government-operated installation, with the primary function of loading and packing munitions.

2.2 Facilities Description

As reported in fiscal year 1994, the Arsenal had 537 buildings comprising approximately 2,397,000 square feet of floor space. The lighting survey was conducted over portions of 45 buildings, totaling 424,823 square feet, or approximately 18 percent of the Arsenal's floor space. The surveyed buildings are listed below:

<u>Bldg #</u>	<u>Description</u>	<u>% Surveyed</u>	<u>Occupant</u>	<u>Surveyed Floor Space (SF)</u>
10-020	Administration Building	Partial	MPCAO (Adj)	21,284
10-030	Administration General Purpose	Complete	Environ Mgt/Sec	6,897
10-050	Fire Headquarters	Complete	FF&P Div	6,532
13-010	Community Services Bldg	Complete	HQ Det	2,429
13-020	US Army Health Clinic	Complete	MEDDAC	3,844
13-030	52nd EOD	Complete	52d EOD	3,007
13-040	BZ/Counseling Facility	Partial	MEDDAC	1,483
13-060	Clinic without beds	Complete	MEDDAC	2,835
13-080	Lab	Complete	MEDDAC/DIR/OTS	4,620
13-100	Infirmery	Complete	MEDDAC	1,920
13-110	Audio Visual Facility	Complete	DOIM	1,974
16-210	Barracks	Hall/shower/restrooms	MPCAO	1,389
16-220	Barracks	Hall/shower/restrooms	Dir/OTS	1,389
31-010	Elec Calibration Lab/No Conversion	Complete	TMDE	332
31-080	Electronic Calibration Facility	Complete	TMDE	1,705
32-030	Inspection Garage	Complete	Mob Equip	5,435
32-035	Ordnance Shop	Complete	Mob Equip	17,640

32-060	Boiler & Compressor House	Complete	BGU&PS Div	4,853
32-070	Impreg & Laundry	Complete	Prop Mgt Div	18,217
32-090	General Purpose Warehouse	Complete	Mob Equip	7,140
32-100	Elec/Com Calibration Fac	Complete	Dir, PA	10,493
32-130	Ammo Qual Assur Fac	Complete	Envir/Nat Resr	3,049
32-150	Ammo Qual Assur Fac	Complete	Envir/Nat Resr	1,260
33-060	Boiler/Compressor	Complete	BGU&PS Div	4,853
33-530	Fill & Press	Complete East/West ends (packout area only)	Prod Div	7,119
34-110	WP Filling	Complete	Prod Div	86,427
34-120	Ammo Quality Fac	Complete South end only	Dir/PA	5,501
34-140	Boiler/Compressor	Complete	BGU&PS Div	2,037
34-910	Admin Gen Purpose/FE Maint Shop	Complete	BGU&PS Div	81,407
34-970	Admin Bldg Gen Purpose	Complete	DEH	1,915
44-100	Prod Fld Ofc Cplx	Complete	Prod Div	25,006
51-420	Office Bldg (DMMD)	Complete	DMMD	7,577
51-430	Engr Admin Bldg	Complete	LRDCE	1,679
53-160	Chemical Admin Bldg	Complete	Dir/E&T	3,917
60-020	Security Bldg (7 Days per week/24 hrs per day)	Complete	Sec Ofc	8,768
60-060	Admin Gen Purpose	Complete	DMMD	3,478
60-070	Fixed Laundry	Complete	DMMD	4,909
60-090	TC Admin Bldg	Complete	DOL	1,833
60-630	Warehouse	Complete	DMMD	8,833
63-100	Chemical Field Maint Shop	Complete	DMMD	7,858
63-110	Chemical Maint Shop	Complete	DMMD	10,040
63-120	Chemical Field Maint Shop	Complete	DMMD	11,349
63-200	Chemical Field Maint Shop	Complete	DMMD	11,804
63-210	Mask Repair	Complete	DMMD	11,352
63-410	Toxic/Conventional Change House	Complete	DMMD	8,034

Each room in each building was surveyed to determine existing lighting conditions as discussed in Section 5.0.

3.0 HISTORICAL ENERGY USE AND COSTS

All historical energy use and cost data were gathered from the U.S. Army Data DEIS (Defense Energy Information System) system, or ADDS, and from Pine Bluff Arsenal records.

3.1 Energy Use

Total facility and production energy consumption at Pine Bluff Arsenal increased by approximately eight percent from FY 85 through FY 94 (Figure 3-1). The cause was the increase in the use of thermal energy by four percent and the use of electricity, which increased 43 percent over the same time period.

Monthly consumption of heating fuels and electricity for FY 94 is shown in Figure 3-2. The dependence of heating fuels on weather is apparent, although thermal energy is required during the summer months for production and other uses. Electricity use is fairly constant throughout the year, with slight increases occurring in the summer months due to air conditioning.

Percentages of fuel use for FY 94 are shown in Figure 3-3. The heating fuels accounted for approximately 86 percent of energy use in that year and electricity the remainder.

3.2 Costs

Total annual energy costs at Pine Bluff Arsenal, \$3,085,671 in FY 94, have increased ten percent over the FY 85 values (Figure 3-4). Electricity shows the greatest increase, approximately 69 percent from FY 85 through FY 94. Unit prices for electricity showed an increase of 18 percent from FY 85 through FY 94 (Figure 3-5).

Figure 3-6 displays monthly energy costs at Pine Bluff Arsenal. As in the case of consumption, heating fuel costs vary widely, depending on weather. Electricity costs are a significant portion of the monthly costs, and can range from 35 percent of the monthly total to more than 60 percent. Electricity costs are a significant percentage of the total annual energy bill

Pine Bluff Arsenal Historical Energy Consumption

Source: ADDS

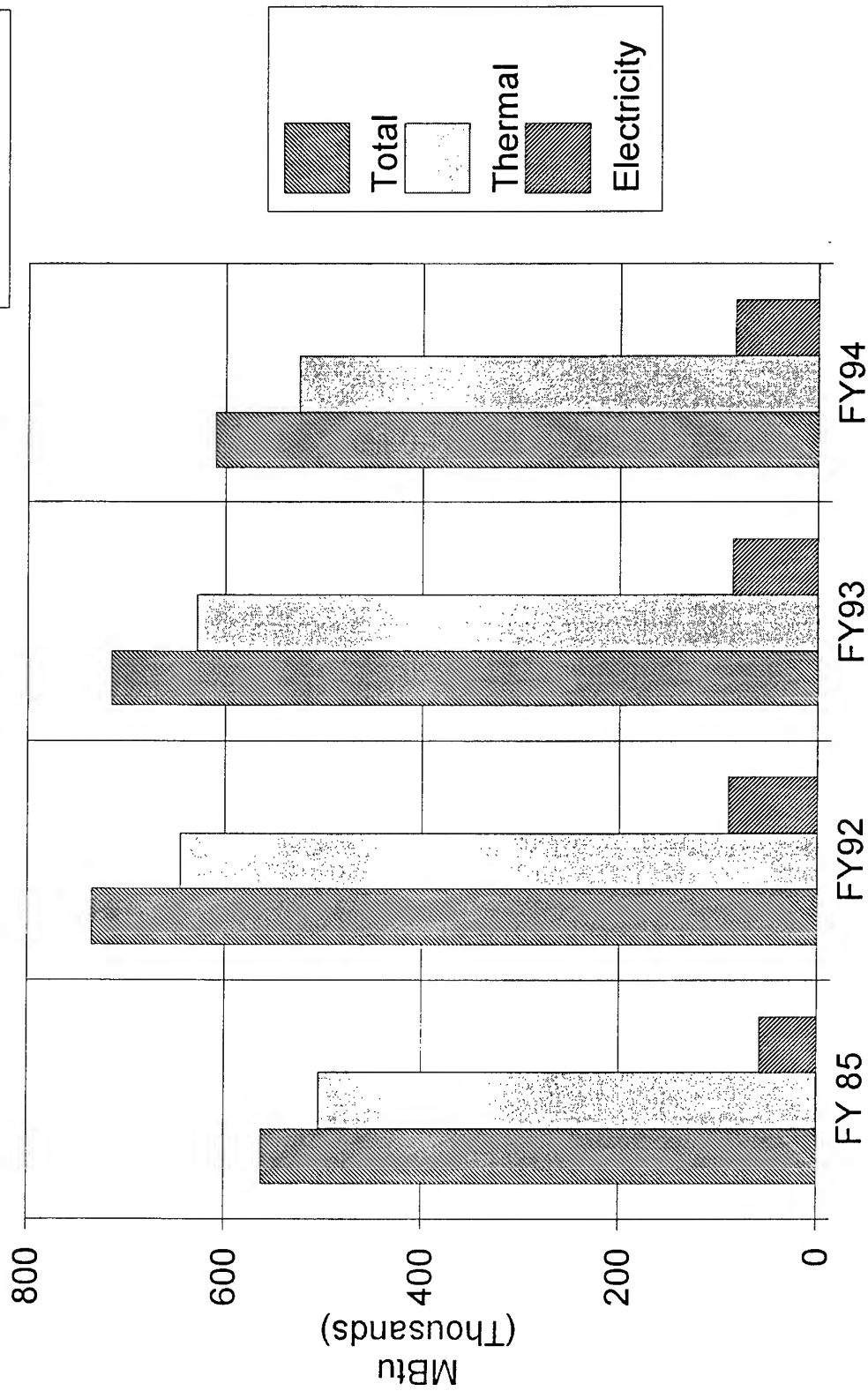


Figure 3-1

Pine Bluff Arsenal

Monthly Energy Consumption

Source: ADDS

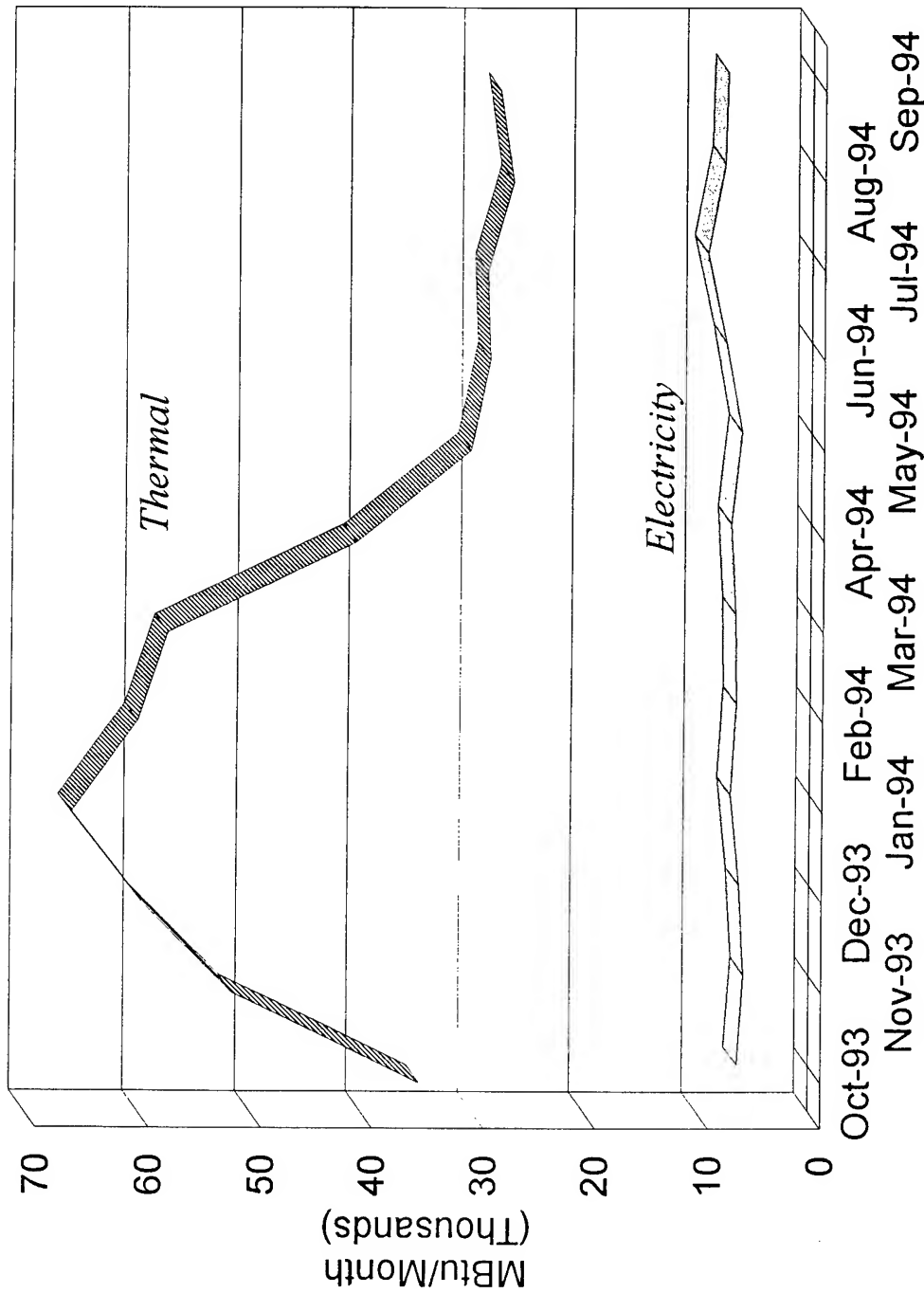


Figure 3-2

Pine Bluff Arsenal

FY 94 Buildings Energy Consumption

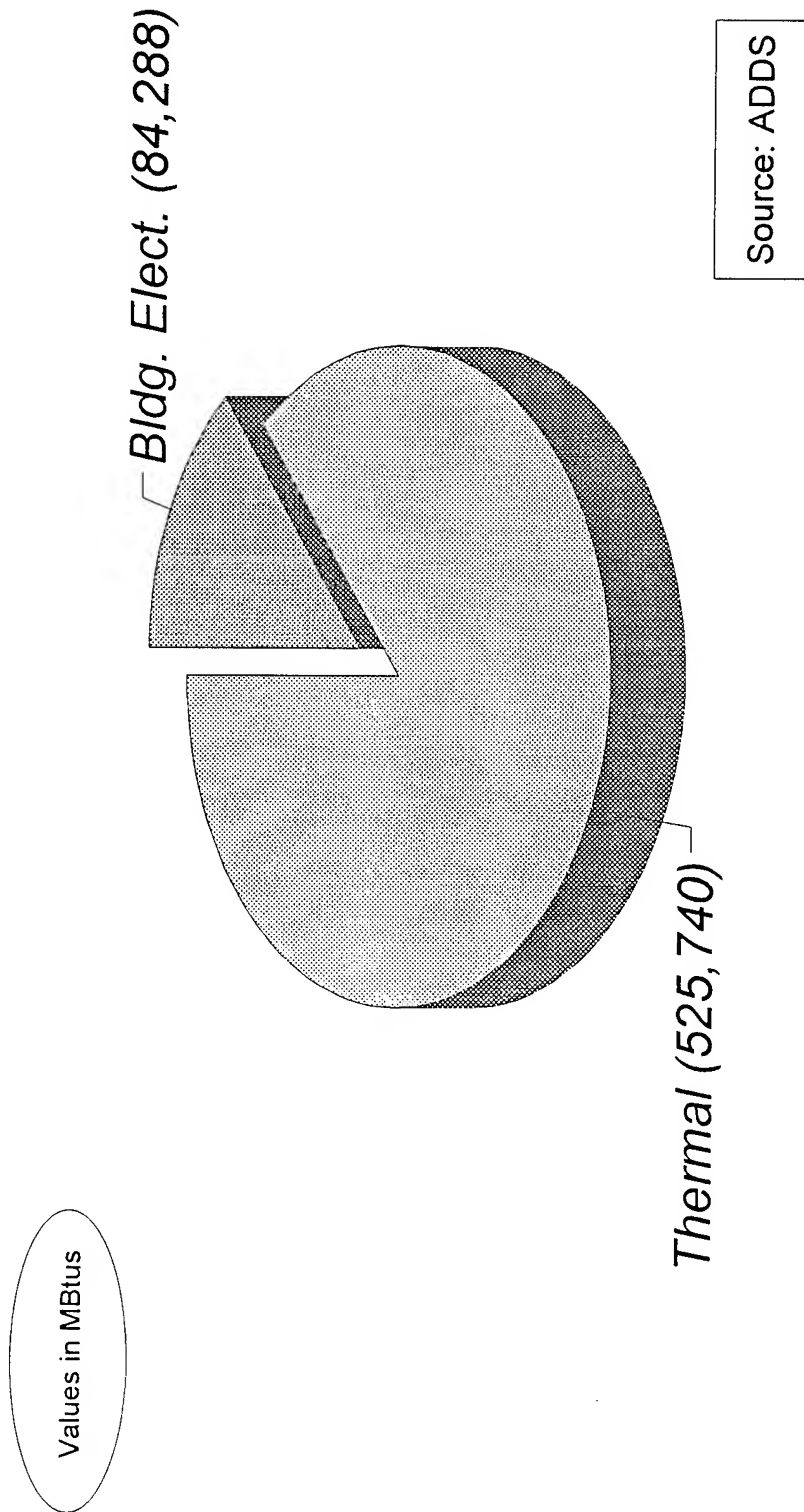


Figure 3-3

Pine Bluff Arsenal Historical Energy Cost

Source: ADDS

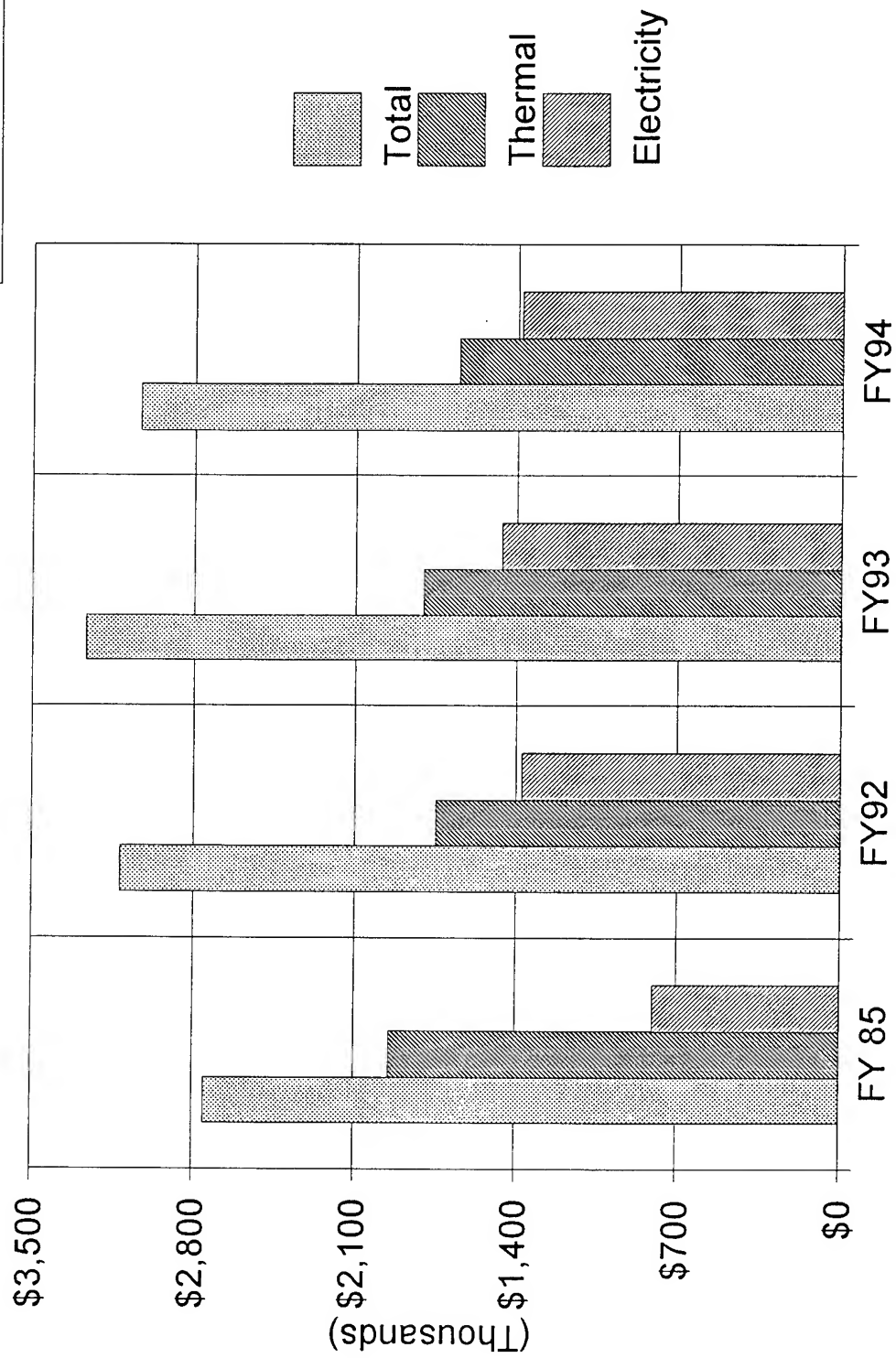


Figure 3-4

Pine Bluff Arsenal Historical Energy Unit Costs

Source: ADDS

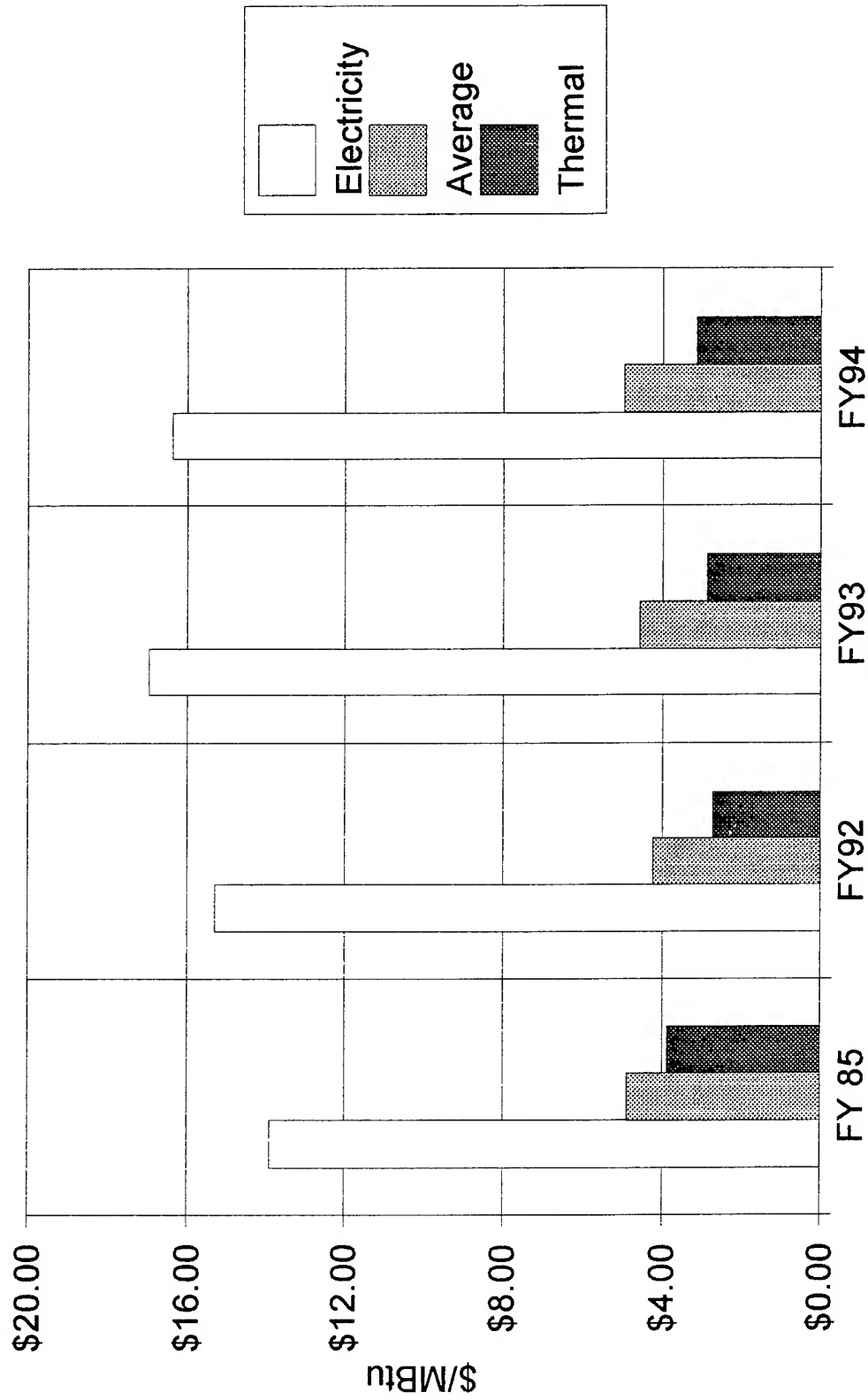


Figure 3-5

Pine Bluff Arsenal Monthly Energy Costs

Source: ADDS

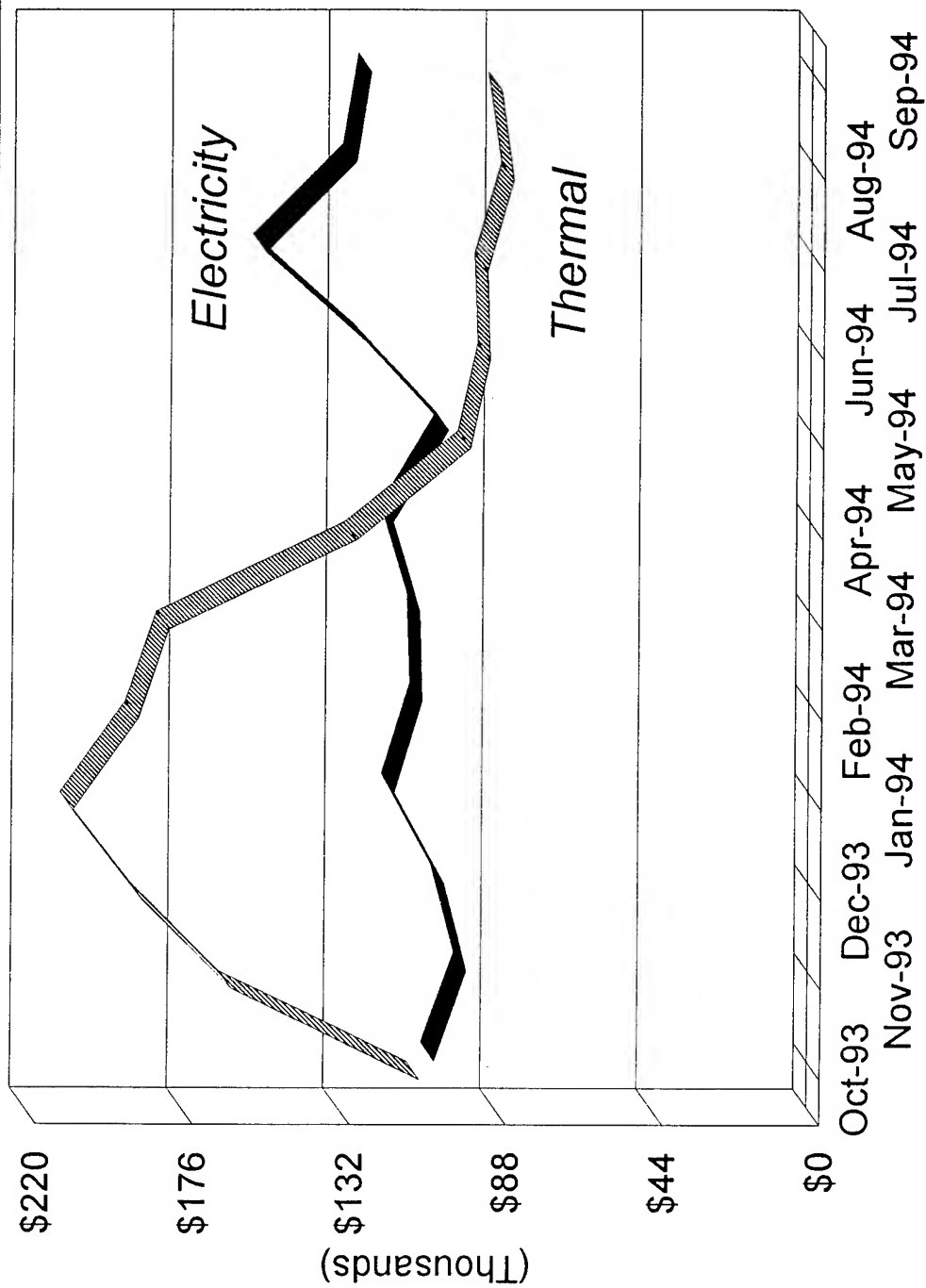


Figure 3-6

because of the higher unit price. In FY 94, electricity costs represented 74 percent of the total buildings expense of \$1,650,000 (Figure 3-7).

3.3 Lighting Energy

Table 3-1 shows the electrical demand in kW and estimated consumption in kWh of the present lighting system in the 45 buildings, based on 2,500 hours of annual occupancy. The table also shows the demand and estimated consumption of the recommended new system, based on the same occupancy schedule.

Percent reductions in watts per square foot, demand and annual energy use are 52 percent.

Effects of occupancy sensors and LED exit signs are not included in the above savings estimate.

Pine Bluff Arsenal

FY 94 Buildings Energy Costs

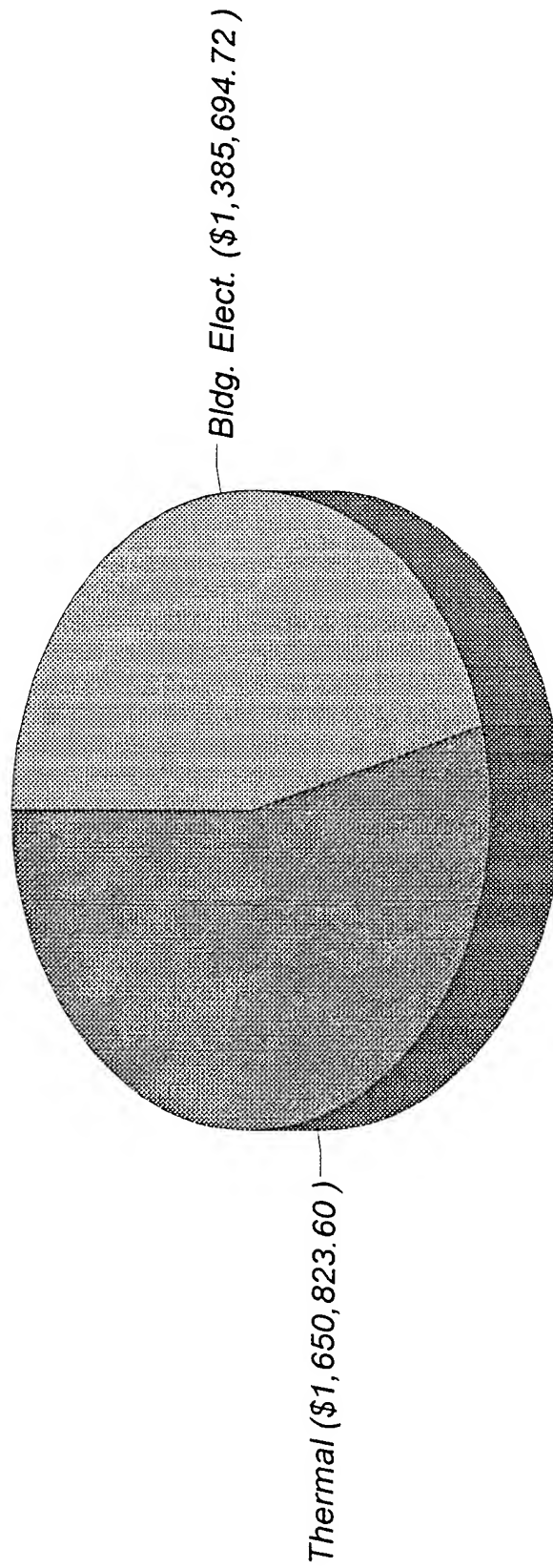


Figure 3-7

Table 3-1. Energy Analysis Summary

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	Bldg. No.	Function	Present System				Replacement System				Savings	
			W/SF	kW	kWh/yr	# Fixt.	W/SF	kW	kWh/yr	# Fixt.	kW	kWh/yr
1	10020	Administration										
2	10030	Admin General Purpose	3.0	38.5	96,215	214	1.0	11.9	29,658	193	26.6	66,558
3	10050	Fire HQ	1.4	8.6	21,465	71	0.6	4.8	11,918	69	3.8	9,548
			0.9	10.2	25,483	105	0.7	7.3	18,365	103	2.8	7,118
4	13010	Community Services										
5	13020	Health Clinic	2.6	5.2	13,110	32	1.0	2.0	5,010	32	3.2	8,100
6	13030	52nd EOD	1.7	6.6	16,385	57	1.0	3.2	7,890	56	3.4	8,495
7	13040	Counseling Facility	1.3	3.5	8,798	26	0.8	2.2	5,405	26	1.4	3,393
8	13060	Clinic	1.6	2.5	6,348	31	1.0	1.6	3,955	27	1.0	2,393
9	13080	Laboratory	2.6	3.5	8,840	23	0.9	1.2	3,103	20	2.3	5,738
10	13100	Infirmary	3.1	3.5	8,678	24	1.3	1.4	3,458	24	2.1	5,220
11	13110	Audio-Visual Facility	1.3	2.5	6,240	24	1.0	1.8	4,415	24	0.7	1,825
			2.3	4.5	11,188	36	1.2	2.3	5,785	32	2.2	5,403
12	16210	Barracks (halls, showers, latrines)										
13	16220	Barracks (halls, showers, latrines)	1.3	1.8	4,490	23	0.6	0.9	2,303	18	0.9	2,188
			1.3	1.8	4,490	23	0.6	0.9	2,303	18	0.9	2,188
14	31010	Electronic Calibration										
15	31080	Electronic Calibration	3.0	1.0	2,385	6	2.1	0.7	1,650	6	0.3	735
			1.9	3.2	8,100	24	1.1	1.9	4,870	24	1.3	3,230
16	32030	Inspection Garage										
17	32035	Ordinance Shop	0.6	3.3	8,133	19	0.5	2.5	6,365	26	0.7	1,768
18	32060	Boiler & Compressor House	1.2	20.7	51,660	252	0.9	14.9	37,170	252	5.8	14,490
19	32070	Impreg. & Laundry	0.3	1.5	3,640	10	0.2	1.0	2,507	10	0.5	1,133
20	32090	Warehouse	1.3	14.6	36,573	104	1.0	10.8	27,075	103	3.8	9,498
21	32100	Elect/Comm. Calibration	1.6	9.8	24,580	60	0.7	3.6	8,968	60	6.2	15,613
22	32130	Ammo Quality Assurance	2.4	25.0	62,470	138	1.0	10.1	25,300	135	14.9	37,170
23	32150	Ammo Quality Assurance	2.8	8.4	21,095	52	1.0	3.2	7,893	51	5.3	13,203
			1.6	2.0	4,980	24	1.1	1.4	3,540	24	0.6	1,440
24	33060	Boiler & Compressor House										
25	33530	Fill and Press (packout areas only)	0.3	1.5	3,640	10	0.2	1.0	2,507	10	0.5	1,133
			2.4	17.1	42,713	83	0.6	4.3	10,768	73	12.8	31,945

Table 3-1. Energy Analysis Summary

Page 2 of 2

	Bldg. No.	Function	Present System			Replacement System			Savings	
			W/SF	kW	kWh/yr	# Fixt.	W/SF	kW	kWh/yr	kW
26	34110	WP Filling	0.6	50.9	127,335	589	0.4	34.7	86,850	16.2
27	34120	Ammo Quality (south end only)	2.1	11.5	28,690	76	0.8	4.1	10,205	7.4
28	34140	Boiler & Compressor House	1.8	3.8	9,433	26	1.0	2.1	5,213	1.7
29	34910	Admin/FE Maint. Shop	2.1	114.5	286,220	507	0.9	41.9	104,640	72.6
30	34970	Administration	3.0	5.7	14,360	42	1.0	2.0	4,890	3.8
31	44100	Production Field Office	1.4	34.6	86,613	300	0.6	15.0	37,620	19.6
32	51420	Offices/DMMD	2.8	20.8	52,060	134	1.0	7.0	17,405	13.9
33	51430	Engineering Administration	2.7	4.5	11,330	33	1.2	1.9	4,838	2.6
34	53160	Chemical Administration	2.0	7.7	19,268	60	0.9	3.4	8,385	4.4
35	60020	Security	0.9	7.8	19,515	58	0.4	3.6	9,030	4.2
36	60060	Administration	2.2	7.6	19,123	51	0.9	3.0	7,428	4.7
37	60070	Fixed Laundry	1.7	8.3	20,865	76	1.0	4.8	12,033	3.5
38	60090	TC Administration	3.3	6.0	15,120	34	1.0	1.9	4,668	4.2
39	60630	Warehouse	0.7	6.2	15,458	39	0.6	5.1	12,668	1.1
40	63100	Chemical Field Maint. Shop	1.6	14.1	35,203	103	0.8	7.0	17,595	7.0
41	63110	Chemical Maint. shop	1.4	14.1	35,148	80	0.5	5.1	12,650	9.0
42	63120	Chemical Field Maint. Shop	0.9	10.2	25,535	56	0.8	8.5	21,165	1.7
43	63200	Chemical Field Maint. Shop	1.4	16.5	41,315	104	0.8	9.4	23,400	7.2
44	63210	Mask Repair	1.0	11.3	28,220	103	0.7	7.8	19,383	3.5
45	63410	Toxic/Conventional Change House	1.0	7.6	19,115	168	0.8	5.9	14,685	1.8
		TOTALS	1.2	564.6	1,411,618	4,110	0.6	270.8	676,925	293.9
										734,693

4.0 REEVALUATED PROJECTS RESULTS

The reevaluation of previous energy-related projects was not included in the Scope of Work.

5.0 ENERGY ANALYSIS

5.1 Energy Conservation Opportunity (ECO) Evaluations

Each of the ECOs listed in the Scope of Work were reviewed for their applicability and potential for significant energy savings and cost effectiveness and are listed in Table 5-1.

For each of the evaluated ECOs, energy savings were calculated, cost estimates made and Life Cycle Cost (LCC) Analyses performed. A listing of evaluated ECOs along with a summary of the energy and cost savings analysis is shown in Table 5-2. Several investigations were made as part of ECO Number 1.

TABLE 5-1 ECOs EVALUATED

	<u>Investigation</u>	<u>Evaluation</u>
1.	Remove unneeded lamps or fixtures.	ECO 1
2.	Reduce indoor lighting where illumination exceeds AEI recommended levels.	ECO 1
3.	Increase daylighting.	ECO 2
4.	Lower light fixtures.	ECO 1
5.	Improve reflection and dispersion with light-colored ceiling and walls	ECO 3
6.	Install occupancy sensors.	ECO 4
7.	Install photocells to lighting near windows	ECO 5
8.	Install additional switches to control lighting arrangements.	ECO 6
9.	Use time clocks to shut off exterior building lights.	ECO 7
10.	Replace incandescent lamps with compact fluorescent lamps.	ECO 1
11.	Replace incandescent exit sign fixtures with LED fixtures.	ECO 8
12.	Replace incandescent lamps in exit signs with compact fluorescent lamps.	ECO 8
13.	Replace standard fluorescent lamps with energy-conserving lamps.	ECO 1

- | | | |
|-----|---|-------|
| 14. | Replace standard fluorescent ballasts with electronic ballasts | ECO 1 |
| 15. | Replace existing fluorescent fixtures with new fixtures having efficient reflectors, electronic ballasts, and energy-conserving lamps | ECO 1 |
| 16. | Use more efficient lighting source, i.e., upgrade from incandescent to fluorescent, from fluorescent to HID, from mercury vapor to high-pressure sodium, etc. | ECO 1 |

TABLE 5-2 ECO EVALUATIONS - RESULTS

ECO	PROJECT NAME	TOTAL CONSTRUCTION COST	SAVINGS, MBtu/Yr ELECTRICITY	NET ANNUAL COST SAVINGS	SIR	SIMPLE PAYBACK (YEARS)
1	Upgrade or Replace Lighting	\$353,750	2,508	\$50,490	1.8	6.7
2	Increase Daylighting	--	--	--	--	--
3	Light-Colored Ceilings and Walls	--	--	--	--	--
4	Install Occupancy Sensors	\$14,020	580	\$11,700	7.9	1.5
5	Install Photocells	--	--	--	--	34.0
6	Install Additional Switching	--	--	--	--	--
7	Install Time Clocks	--	--	--	--	--
8	LED Exit Signs	\$2,450	46	\$930	4.6	2.6
TOTALS		\$370,220	3,134	\$63,120	2.0	5.9

ECO Number 1

UPGRADE OR REPLACE LIGHTING

Discussion

As shown in Table 5-1, several investigations for energy conservation opportunities were combined into one ECO. Data were taken in each room of each of the 45 surveyed buildings to determine the type and condition of the existing luminaires, representative illumination levels (footcandles) representative types of lamps and ballasts, the room dimensions, the height and location of the fixtures, and the type and accessibility of switching. Notations were done on RS&H-provided data forms, and photographs were taken where allowed by security. Drawings were provided by the Arsenal's Engineering Plans and Services and were also used to note fixture positions. Fixture positions in each room were input to the analysis program.

A PC-based computer program, "Lite-Pro," provided by USI Lighting Company, was used to analyze the illumination levels point-by-point and the unit power density within each room. The program also keeps track of the number of fixtures, by type, for each building and each room.

Initially, analyses were done for the existing luminaires. Although the photometric data base of Lite-Pro is extensive, it was not possible to match existing fixtures exactly to the data base because of lack of manufacturers names and model numbers. Fixture types were noted during the site survey, however, and similar fixtures were selected for analysis. Calculated illuminance levels were reasonably close to those noted on the site survey data sheets, given the wide range of conditions and lifetimes of the existing fixtures.

Point-by-point analysis was then done for each room with the following criteria:

- 1) Illuminance levels were to be brought into line with AEI recommendations. In many cases, present levels are too high.
- 2) T8 lamps and electronic ballasts would replace existing T12 lamps and electromagnetic ballasts, including energy-saving lamps and

ballasts already in place. The T12 and electromagnetic-technologies should be phased out and the T8 technology adopted installationwide.

- 3) Existing fixtures would be used where possible. If illuminance levels were reduced, lamps would be removed; reflectors would be installed if necessary to meet AEI footcandle (FC) recommendations. Fixtures would be moved if practical and necessary.
- 4) Higher-efficiency fixtures would replace low-efficiency fixtures where practical.
- 5) Compact fluorescent lamps would replace incandescent lamps where practical. Exceptions were made for fixtures with low utilization (e.g., janitors' closets).
- 6) Excessive fixtures would be removed where necessary.

Table 5-3 shows a summary of the changes made by building based on analysis result. In all:

- 1) 843 fixtures are removed, and 641 installed. The installed fixtures are various energy-efficient types, and include compact fluorescent replacement of incandescent lamps. All new fixtures employ T8 technology.
- 2) 3,109 fixtures are changed (upgraded); 8,776 lamps and 4,475 ballasts are removed, and 6,464 T8 lamps and 3,109 electronic ballasts installed; 270 reflectors are also installed in existing fixtures.

Table 3-1 (See Section 3.3) is a summarization of the energy analysis results, by building. The table shows comparisons between the existing lighting systems and the proposed replacements:

- 1) Average unit power density for the 45 buildings will be reduced from 1.2 W/sf to 0.6 W/sf.
- 2) Total luminaire wattage will be reduced from 565 kW to 271 kW.

Table 5-3. Fixture Changeout Summary

	Bldg. No.	Function	Fixtures Removed	Fixtures Installed	Fixtures Upgraded	Reflectors Installed	T12 Lamps Removed	EM Blsts Removed	T8 Lamps Installed	El. Blsts Installed
1	10020	Administration	169	149	44	40	164	84	88	44
2	10030	Admin General Purpose	4	2	67	21	224	112	155	67
3	10050	Fire HQ	6	4	46	17	126	63	92	46
4	13010	Community Services	0	0	28	2	104	52	56	28
5	13020	Health Clinic	12	11	34	13	90	45	76	34
6	13030	52nd EOD	0	0	25	7	84	42	74	25
7	13040	Counseling Facility	5	1	26	0	52	26	52	26
8	13060	Clinic	3	0	17	5	68	34	34	17
9	13080	Laboratory	21	21	2	0	8	4	8	2
10	13100	Infirmary	2	2	15	0	38	19	36	15
11	13110	Audio-Visual Facility	5	1	29	0	84	42	68	29
12	16210	Barracks (halls, showers, latrines)	8	3	15	0	24	15	24	15
13	16220	Barracks (halls, showers, latrines)	8	3	15	0	24	15	24	15
14	31010	Electronic Calibration	0	0	6	0	24	12	24	6
15	31080	Electronic Calibration	0	0	24	0	90	45	68	24
16	32030	Inspection Garage	15	22	4	0	8	4	8	4
17	32035	Ordinance Shop	0	0	252	0	504	252	504	252
18	32060	Boiler & Compressor House	0	0	9	0	21	12	21	9
19	32070	Impreg. & Laundry	1	0	103	0	212	106	212	103
20	32090	Warehouse	0	0	60	24	240	120	122	60
21	32100	Elect/Comm. Calibration	3	0	135	3	464	232	282	135
22	32130	Ammo Quality Assurance	3	2	49	48	194	97	98	49
23	32150	Ammo Quality Assurance	0	0	24	4	48	24	48	24
24	33060	Boiler & Compressor House	0	0	9	0	21	12	21	9
25	33530	Fill and Press (packout areas only)	83	73	0	0	0	0	0	0
26	34110	WP Filling	0	0	589	0	1,218	609	1,178	589
27	34120	Ammo Quality (south end only)	36	21	40	14	111	73	94	40
28	34140	Boiler & Compressor House	16	15	10	0	20	10	20	10
29	34910	Admin/FE Maint. Shop	88	81	412	8	1,427	715	846	412
30	34970	Administration	12	4	28	0	96	48	56	28
31	44100	Production Field Office	70	29	218	5	631	344	436	218
32	51420	Offices/DMMD	16	0	118	0	452	227	236	118
33	51430	Engineering Administration	8	4	25	0	82	41	50	25
34	53160	Chemical Administration	5	5	55	4	178	89	110	55
35	60020	Security	26	24	32	4	106	53	66	32
36	60060	Administration	3	3	46	35	178	89	92	46
37	60070	Fixed Laundry	16	17	60	0	126	63	122	60
38	60090	TC Administration	34	33	0	0	0	0	0	0
39	60630	Warehouse	10	16	11	0	26	13	22	11
40	63100	Chemical Field Maint. Shop	16	0	87	2	240	120	174	87
41	63110	Chemical Maint. shop	4	0	75	0	290	145	156	75
42	63120	Chemical Field Maint. Shop	3	2	21	0	56	28	42	21
43	63200	Chemical Field Maint. Shop	0	0	104	14	398	199	344	104
44	63210	Mask Repair	15	0	85	0	170	85	170	85
45	63410	Toxic/Conventional Change House	97	93	55	0	55	55	55	55
		TOTALS	823	641	3,109	270	8,776	4,475	6,464	3,109

- 3) Annual energy use, assuming 2,500 hours per year average use per fixture, will be reduced from approximately 1,411,620 kWh/yr to 676,925 kWh/yr.

Recommendations

The life-cycle cost analysis program, LCCID 1.092, was used to determine the costs/benefits of the fixtures replacement. Based on the energy savings to Pine Bluff Arsenal, it is recommended that the project be implemented. The ECO showed the following costs/benefits:

Construction Costs (\$)	\$353,750
Energy Savings (MBtu/yr)	
Electricity	2,508
Energy Cost Savings (\$/yr)	50,500
SIR	1.8
Simple Payback (years)	6.7

Energy cost savings include the savings from the reduction in A/C loads (estimated at \$2,600 per year). Economic life of the project was assumed to be 15 years.

LIFE CYCLE COST ANALYSIS SUMMARY
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: PBA01
 INSTALLATION & LOCATION: PINE BLUFF ARS REGION NOS. 6 CENSUS: 3 LCCID FY95 (92)
 PROJECT NO. & TITLE: 1 LIGHTING STUDY
 FISCAL YEAR 95 DISCRETE PORTION NAME: LIGHTING
 ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT
 A. CONSTRUCTION COST \$ 315851.
 B. SIOH \$ 18951.
 C. DESIGN COST \$ 18951.
 D. TOTAL COST (1A+1B+1C) \$ 353753.
 E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0.
 F. PUBLIC UTILITY COMPANY REBATE \$ 0.
 G. TOTAL INVESTMENT (1D - 1E - 1F) \$ 353753.

2. ENERGY SAVINGS (+) / COST (-)
 DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 20.13	2508.	\$ 50486.	12.02	\$ 606842.
B. DIST	\$.00	0.	\$ 0.	14.23	\$ 0.
C. RESID	\$.00	0.	\$ 0.	15.87	\$ 0.
D. NAT G	\$.00	0.	\$ 0.	14.17	\$ 0.
E. COAL	\$.00	0.	\$ 0.	13.28	\$ 0.
F. PPG	\$.00	0.	\$ 0.	13.49	\$ 0.
M. DEMAND SAVINGS			\$ 0.	11.94	\$ 0.
N. TOTAL		2508.	\$ 50486.		\$ 606842.

3. NON ENERGY SAVINGS(+) / COST(-)
 A. ANNUAL RECURRING (+/-)
 (1) DISCOUNT FACTOR (TABLE A) 11.94
 (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ 26614.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
------	------------------------------	-----------------	------------------------	---

d. TOTAL \$ 0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4) \$ 26614.

4. FIRST YEAR DOLLAR SAVINGS $2N3+3A+(3Bd1/(YRS\ ECONOMIC\ LIFE))$ \$ 52715.

5. SIMPLE PAYBACK PERIOD (1G/4) 6.71 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 633456.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 1.79
 (IF < 1 PROJECT DOES NOT QUALIFY)

ECO Number 2

INCREASE DAYLIGHTING

Discussion

No opportunities were observed to cost-effectively increase daylighting to accomplish energy savings.

Recommendations

This ECO is not recommended.

ECO Number 3

LIGHT-COLORED CEILINGS AND WALLS

Discussion

The use of light-colored ceilings and walls are a means of increasing the reflectance of light fixtures. However, point-by-point calculations show only marginal increases from light-colored walls compared to increasing the fixture's efficiency.

Recommendations

It is not recommended to re-paint or install new ceilings based on energy savings. Whenever painting is done as a part of building maintenance, use of light-colored paints are recommended.

ECO Number 4

OCCUPANCY SENSORS

Discussion

The site survey revealed that lights were on in many unoccupied areas. Candidates for occupancy sensors are restrooms, breakrooms, conference rooms and offices. Screening calculations showed that occupancy sensors in restrooms and breakrooms offer potential simple paybacks within the ten-year limitation.

Recommendations

The LCC analysis program, LCCID 1.092, was used to determine the costs/benefits of the installation of occupancy sensors. A 15-year economic life was used, and an electricity price of \$0.0687/kWh. Based on the energy savings to Pine Bluff Arsenal, it is recommended that the project be implemented. The ECO showed the following costs/benefits:

Construction Costs (\$)	\$14,019
Energy Savings (MBtu/yr)	
Electricity	581
Energy Cost Savings (\$/yr)	11,700
SIR	7.9
Simple Payback (years)	1.5

LIFE CYCLE COST ANALYSIS SUMMARY
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: PBA01
 INSTALLATION & LOCATION: PINE BLUFF ARS REGION NOS. 6 LCCID FY95 (92)
 PROJECT NO. & TITLE: 1 LIGHTING STUDY CENSUS: 3
 FISCAL YEAR 95 DISCRETE PORTION NAME: OCCUPANCY SENSORS
 ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT

A. CONSTRUCTION COST	\$	12517.		
B. SIOH	\$	751.		
C. DESIGN COST	\$	751.		
D. TOTAL COST (1A+1B+1C)	\$	14019.		
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$	0.		
F. PUBLIC UTILITY COMPANY REBATE	\$	0.		
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$		14019.	

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 20.13	581.	\$ 11700.	12.02	\$ 140629.
B. DIST	\$.00	0.	\$ 0.	14.23	\$ 0.
C. RESID	\$.00	0.	\$ 0.	15.87	\$ 0.
D. NAT G	\$.00	0.	\$ 0.	14.17	\$ 0.
E. COAL	\$.00	0.	\$ 0.	13.28	\$ 0.
F. PPG	\$.00	0.	\$ 0.	13.49	\$ 0.
M. DEMAND SAVINGS			\$ 0.	11.94	\$ 0.
N. TOTAL		581.	\$ 11700.		\$ 140629.

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)		\$ -2462.
(1) DISCOUNT FACTOR (TABLE A)	11.94	
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$ -29396.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
d. TOTAL	\$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ -29396.

4. FIRST YEAR DOLLAR SAVINGS $2N3+3A+(3Bd1/(YRS\ ECONOMIC\ LIFE))$ \$ 9238.

5. SIMPLE PAYBACK PERIOD (1G/4) 1.52 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 111232.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 7.93
 (IF < 1 PROJECT DOES NOT QUALIFY)

ECO Number 5

INSTALL PHOTOCELLS

Discussion

Screening calculations for this ECO showed that the measure would not be cost effective. The costs of controls, the sensor, and dimming ballasts make the simple payback in excess of 30 years for a typical south-facing office with windows (having four, two-lamp T-8 fixtures).

Recommendations

Based on costs/benefits, this ECO is not recommended.

ECO Number 6

INSTALL ADDITIONAL SWITCHING

Discussion

Most areas observed had adequate and available switching. Opportunities for this ECO are limited.

Recommendations

This ECO is not recommended for implementation.

ECO Number 7

INSTALL TIME CLOCKS FOR EXTERIOR BUILDING LIGHTS

Discussion

Virtually all exterior lights of the 45 buildings were off during daylight hours, as observed during the survey.

Recommendations

This ECO is not needed and is not recommended. Education of building occupants is the most effective measure.

ECO Number 8

LED EXIT SIGN LAMPS

Discussion

The majority of exit signs in the 45 surveyed buildings contain two, 15-watt incandescent lamps. LED lamps are a low-cost, energy-efficient retrofit. It was noted that many exit signs are burned out, and many exits do not have signs.

A survey of the drawings show that there are a total of approximately 225 exits in the 45 buildings. Ten of the exits have radioactive signs, and 55 have existing signs. This project is for retrofits of the 55 signs, only.

Recommendations

Based on the cost/benefits to Pine Bluff Arsenal, it is recommended that ECO Number 8 be implemented. The ECO shows the following costs/benefits:

Construction Costs (\$)	\$2,454
Energy Savings (MBtu/yr)	
Electricity	46
Energy Cost Savings (\$/yr)	932
SIR	4.6
Simple Payback (years)	2.6

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: PBA01
INSTALLATION & LOCATION: PINE BLUFF ARS REGION NOS. 6 CENSUS: 3 LCCID FY95 (92)
PROJECT NO. & TITLE: 1 LIGHTING STUDY
FISCAL YEAR 95 DISCRETE PORTION NAME: LED EXIT SIGNS
ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT

A. CONSTRUCTION COST	\$	2190.	
B. SIOH	\$	132.	
C. DESIGN COST	\$	132.	
D. TOTAL COST (1A+1B+1C)	\$	2454.	
E. SALVAGE VALUE OF EXISTING EQUIPMENT	\$	0.	
F. PUBLIC UTILITY COMPANY REBATE	\$	0.	
G. TOTAL INVESTMENT (1D - 1E - 1F)	\$	2454.	

2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 20.13	46.	\$ 932.	12.02	\$ 11203.
B. DIST	\$.00	0.	\$ 0.	14.23	\$ 0.
C. RESID	\$.00	0.	\$ 0.	15.87	\$ 0.
D. NAT G	\$.00	0.	\$ 0.	14.17	\$ 0.
E. COAL	\$.00	0.	\$ 0.	13.28	\$ 0.
F. PPG	\$.00	0.	\$ 0.	13.49	\$ 0.
M. DEMAND SAVINGS			\$ 0.	11.94	\$ 0.
N. TOTAL		46.	\$ 932.		\$ 11203.

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)		\$	0.
(1) DISCOUNT FACTOR (TABLE A)		11.94	
(2) DISCOUNTED SAVING/COST (3A X 3A1)		\$	0.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
d. TOTAL	\$ 0.			0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 0.

4. FIRST YEAR DOLLAR SAVINGS $2N3+3A+(3Bd1/(YRS \text{ ECONOMIC LIFE}))$ \$ 932.

5. SIMPLE PAYBACK PERIOD (1G/4) 2.63 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 11203.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 4.57
(IF < 1 PROJECT DOES NOT QUALIFY)

5.2 Multiple ECO Project Evaluations

ECIP Number 1

LIGHTING RETROFITS

Discussion

This project combines ECOs as listed below:

<u>ECO #</u>	<u>ECO Description</u>
1	Upgrade or Replace Lighting
4	Occupancy Sensors
8	LED Exit Sign Retrofits

Detailed discussions are contained in the previous section (5.1).

Recommendations

The life-cycle cost analysis program LCCID 1.092, was used to determine the cost/benefits of this ECIP. Based on the energy savings to Pine Bluff Arsenal, it is recommended. The results are summarized below.

Construction Cost	\$370,226
Annual Energy Savings (MBtu/year)	
Electricity	3,135
Annual Energy Cost Savings (\$/year)	\$63,108
SIR	2.0
Simple Payback (years)	5.9

LIFE CYCLE COST ANALYSIS SUMMARY
 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) STUDY: PBA01
 INSTALLATION & LOCATION: PINE BLUFF ARSREGION NOS. 6 CENSUS: 3 LCCID FY95 (92)
 PROJECT NO. & TITLE: 1 LIGHTING STUDY
 FISCAL YEAR 95 DISCRETE PORTION NAME: TOTAL
 ANALYSIS DATE: 03-27-95 ECONOMIC LIFE 15 YEARS PREPARED BY: C. WARREN

1. INVESTMENT
 A. CONSTRUCTION COST \$ 330558.
 B. SIOH \$ 19834.
 C. DESIGN COST \$ 19834.
 D. TOTAL COST (1A+1B+1C) \$ 370226.
 E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0.
 F. PUBLIC UTILITY COMPANY REBATE \$ 0.
 G. TOTAL INVESTMENT (1D - 1E - 1F) \$ 370226.

2. ENERGY SAVINGS (+) / COST (-)
 DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1994

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELECT	\$ 20.13	3135.	\$ 63108.	12.02	\$ 758553.
B. DIST	\$.00	0.	\$ 0.	14.23	\$ 0.
C. RESID	\$.00	0.	\$ 0.	15.87	\$ 0.
D. NAT G	\$.00	0.	\$ 0.	14.17	\$ 0.
E. COAL	\$.00	0.	\$ 0.	13.28	\$ 0.
F. PPG	\$.00	0.	\$ 0.	13.49	\$ 0.
M. DEMAND SAVINGS			\$ 0.	11.94	\$ 0.
N. TOTAL		3135.	\$ 63108.		\$ 758553.

3. NON ENERGY SAVINGS(+) / COST(-)
 A. ANNUAL RECURRING (+/-)
 (1) DISCOUNT FACTOR (TABLE A) 11.94
 (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ -2782.

B. NON RECURRING SAVINGS(+) / COSTS(-)

ITEM	SAVINGS(+) COST(-) (1)	YR OC (2)	DISCNT FACTR (3)	DISCOUNTED SAVINGS(+)/ COST(-)(4)
------	------------------------------	-----------------	------------------------	---

d. TOTAL \$ 0.

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-) (3A2+3Bd4) \$ -2782.

4. FIRST YEAR DOLLAR SAVINGS $2N3+3A+(3Bd1/(YRS\ ECONOMIC\ LIFE))$ \$ 62875.

5. SIMPLE PAYBACK PERIOD (1G/4) 5.89 YEARS

6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) \$ 755771.

7. SAVINGS TO INVESTMENT RATIO (SIR)=(6 / 1G)= 2.04
 (IF < 1 PROJECT DOES NOT QUALIFY)

6.0 ENERGY AND COST SAVINGS

6.1 Project Packaging

The ECOs listed in Table 5-2 are recommended for packaging into a single ECIP project. The guidelines to qualify as an ECIP project are project cost greater than \$300,000, simple payback less than ten years, and SIR greater than 1.25. This project is programmed for FY 96 funding.

6.2 Energy and Cost Savings

The implementation of all projects yield a total annual energy savings of 3,135 MBtu and annual cost savings equal to \$62,875, which represents a reduction of 3.6 percent and 4.4 percent, respectively in total electrical energy use and cost when compared to FY 94 values. Lighting energy use in the 45 buildings surveyed will be reduced 52 percent. Based on FY 94 values, the energy use and costs before and after project implementation are shown in the following table and in Figure 6-1:

TABLE 6-1 EFFECTS OF PROJECT IMPLEMENTATION

	<u>BEFORE</u>	<u>AFTER</u>	<u>% REDUCTION</u>
Electricity Use (MBtu/yr)	86,045	82,410	3.6
Electricity Cost (\$/yr)	1,414,909	1,352,034	4.4

Source: ADDS

6.3 Project Schedule

The project implementation date is estimated to be FY 96.

Pine Bluff Arsenal

Projected Energy Savings

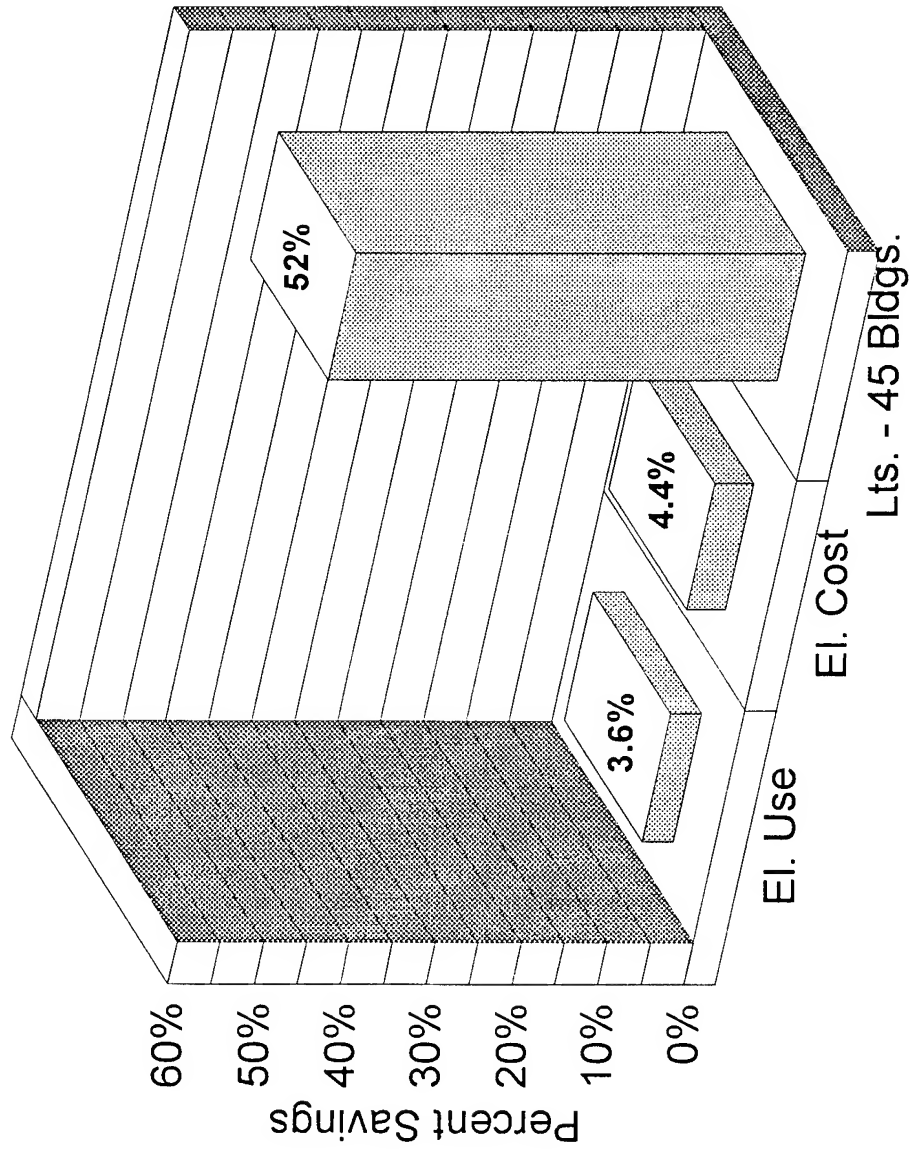


Fig 6-1

Transmittal Letter

RS&H

Architecture, Engineering and Planning

To: Commander
U. S. Army Engineer District, Mobile
P. O. Box 2288
Mobile, AL 36628
Attn: CESAM-EN-CM (Mr. Battaglia)

Date: August 16, 1995

Project: Lighting Survey, Pine Bluff Arsenal
Contract DACA01-94-D-0038
Delivery Order No. 0001

Project No: 694-1331-001

We Transmit:

☒ herewith
☐ under separate cover

For Your:

☐ approval
☐ review & comment
☒ use

The Following:

Copies	Date	Description
1	16 August 1995	Responses to Comments - Final Submittal

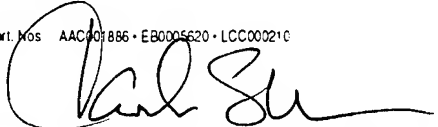
Remarks:

Copies To:

Reynolds, Smith and Hills, Inc.
4651 Salisbury Road
Jacksonville, Florida 32256
904-296-2000 Fax 904-279-2491

FL Cert. Nos AAC001886 • EB0005620 • LCC000210

By:


Carlos S. Warren, PhD, PE
Project Manager

PROJECT: EEAP, LIGHTING STUDY, PINE BLUFF ARSENAL, DACA01-94-D-0038,
DELIVERY ORDER NO. 0001, AEP NO. 694-1331-001

DATE: 15 AUGUST 1995

RESPONSES TO FINAL SUBMITTAL COMMENTS (EMMERLING)

<u>CMT#</u>	<u>REF</u>	<u>RESPONSE</u>
1.	Vol. I pp 6-3 through 6-22	Coefficients of utilization (CU) have been added to tables in Section 6. Pages 6-3 through 6-22 should be removed from Volume I and the enclosed pages 6-3 through 6-21 inserted in their place.
2.	Vol. I page 6-2	Assumed fixture cleaning intervals of once per year has been added to explanation of proposed LLF. Page 6-2 should be removed and the enclosed page 6-2 inserted in its place.
3.	Vol. IV PDB-1, PDB-2	Disposal of fluorescent lamps was coordinated with PBA DPW. Comments were added to PDB-1, Item E-6 and PDB-2, Item E-1, instructing contractors to coordinate disposal with the PBA Environmental Compliance group. Pages 10 and 23 of PDB-1 and PDB-2, respectively, should be removed and the enclosed pages inserted in their respective places.
4.	Vol. IV PDB-1, PDB-2	PDB-1, and E-1, PDB-2 to return lamps and ballasts that are removed and are in good working order to PBA.

PROJECT: EEAP, LIGHTING STUDY, PINE BLUFF ARSENAL, DACA01-94-D-0038, DELIVERY ORDER NO. 0001

REVIEWER: EMMERLING

DATE: 10 JULY 95

FINAL SUBMITTAL COMMENTS

<u>CMT #</u>	<u>REF</u>	<u>COMMENT</u>
1	VOL I	IF AT ALL POSSIBLE PROVIDE COEFFICIENT OF UTILIZATION (CU) FOR PRESENT AND PROPOSED EACH ROOM, EACH BLDG. THIS CAN BE ADDED TO THE "PINE BLUFF ARSENAL CALCULATIONS SUMMARY". IN THE INTERIM SUBMITTAL COMMENT MEETING IT WAS DECIDED THAT YOU WOULD PROVIDE MFG'S CU SHEETS (YOU CALL THIS FIXTURE DATA IN YOUR RESPONSES TO THE INTERIM SUBMITTAL) TO SATISFY THIS COMMENT WHICH WAS DONE BUT I WAS NOT ABLE TO CROSS REFERENCE THE POINT BY POINT CALCULATION SHEET FIXTURE MODEL NOS. TO THE MFG'S CU SHEETS TO CHECK YOUR FT-C CALCULATIONS USING THE ZONAL CAVITY METHOD.
2	VOL I	PAGE 6-2, <u>PROPOSED LLF</u> , "DIRT DEPRECIATION AS 0.87 (ASSUMING FIXTURES ARE CLEANED). FIXTURES RETROFIT WITH REFLECTORS WOULD BE CONSIDERED AS NEW (DIRT DEPRECIATION = 1.0)". PROVIDE ASSUMED FIXTURE CLEANING INTERVALS TO MAINTAIN THESE ASSUMPTIONS.
3	VOL IV	I DID NOT SEE ANY COMMENTS ON DISPOSAL OF FLOURESCENT LAMPS WHICH MAY CONTAIN MERCURY. COORDINATE WITH THE PINE BLUFF ARSENAL DPW ON THIS.
4	VOL IV	THE PBA DPW HAS INDICATED THAT EXISTING LAMPS AND BALLASTS TO BE REMOVED SHOULD BE TURNED OVER TO THE GOVT. FOR REUSE IF NOT PCB CONTAMINATED AND IN GOOD SHAPE. PROVIDE NOTES ON THIS IN THE PDB.

Present CU - The coefficient of utilization (CU) of the present fixtures.

Present LLF - The light-loss-factor (LLF) used for each of the present fixtures. The LLF is the product of the ballast factor, the lamp depreciation factor and the dirt depreciation factor. For electromagnetic ballasts, the factor is usually set at ~0.95. The lamp depreciation and the dirt depreciation are somewhat subjective. For new or fairly-new lamps, the depreciation factor is usually set at 0.9 to take into account at 10 percent light loss over the average lifetime of the lamp. Dirt depreciation is a function of fixture and room conditions. Office environments are usually taken as clean; production area environments as medium. The depreciation for yellowed lenses or generally dirty fixtures was also factored in. The following dirt depreciation factors were used: very clean, 0.87; clean, 0.81; medium, 0.75; dirty, 0.68; very dirty, 0.61.

As stated in Section 4, the present-fixture calculation factors were adjusted to try to approximate the observed conditions. The reader must be cautioned, however, that the fixture selections, coefficients of utilization and depreciation factors are only approximations, and are meant to present a situation showing where changes in fixture components can be made to increase efficiencies and improve lighting quality.

Proposed Avg. Calc. FC - The average foot-candles calculated for the changed fixtures, either retrofits or new. Illuminance contours are presented for each room in Volumes IIA - IIE and should be consulted for a more accurate analysis of the lighting calculations. Reflectances were assumed to remain the same as the present case.

Proposed CU - The coefficient of utilization of the proposed fixtures.

Proposed LLF - The light loss factor used for the new or retrofit fixtures. Electronic Ballast factor was taken as 0.88 - 0.90, lamp depreciation as 0.9, dirt depreciation as 0.87 (assuming fixtures are cleaned). Fixtures retrofit with reflectors would be considered as new (dirt depreciation = 1.0). Lamps above a porous ceiling grid had a miscellaneous depreciation factor added to account for light loss. Fixtures should be cleaned at least once per year to maintain the LLF.

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
10-020	Break	Lounge	15	42	27	0.672	.36/.72*	21	0.672	0.59
	Vending	Lounge	15	23	19	0.464	0.47	24	0.488	0.58
	100	Office	50	58	48	0.584	0.51	50	0.604	0.79
	101	Office	50	60	53	0.559	0.51	46	0.499	0.79
	103	Office	50	58	59	0.549	0.51	50	0.491	0.79
	106	Office	50	70	62	0.423	0.68	44	0.556	0.79
	107	Office	50	56	78	0.481	0.68	40	0.542	0.79
	112	Office	50	66	53	0.556	0.51	40	0.579	0.79
	Hall	Corridor	10	44	37	0.427	0.51	10	0.256	0.47
	115	Office	50	86	76	0.603	0.51	42	0.62	0.79
	117	Office	50	83	57	0.544	.68/.51*	43	0.568	0.79
	201/203	Office	50	73	39	0.658	0.48	39	0.667	0.79
	202	Office	50	88	60	0.457	0.73	47	0.702	0.79
	205	Office	50	67	67	0.574	0.51	56	0.512	0.79
	206	Office	50	60	58	0.505	0.68	43	0.658	0.79
	207	Office	50	72	66	0.524	0.84	37	0.59	0.79
	209	Office	50	78	66	0.529	0.84	37	0.595	0.79
	221	Office	50	58	40	0.568	0.51	40	0.59	0.79
	223/229	Office	50	61	70	0.514	0.68	42	0.582	0.79
	228	Office	50	35	47	0.458	0.51	36	0.492	0.79
	231	Office	50	79	31	0.542	0.51	36	0.567	0.79
	232	Office	50	50	46	0.719	0.51	35	0.718	0.79
	263	Office	50	69	50	0.572	0.51	43	.5/.59*	.69/.79*
	265	Office	50	41	42	0.55	0.51	36	0.492	0.79
	266	Office	50	79	45	0.626	0.51	46	0.64	0.79
	267	Office	50	73	45	0.527	0.51	47	0.554	0.79
	269	Office	50	56	43	0.598	0.51	44	0.616	0.79
	270	Office	50	89	48	0.588	0.51	45	.52/.61	0.79
	282	Office	50	95	63	0.519	0.73	39	0.585	0.79
	284	Office	50	57	43	0.542	0.51	34	0.567	0.79
	286B	Office	50	66	58	0.48	.58/.73*	40	0.548	0.79
	288	Office	50	82	59	0.476	0.68	45	0.621	0.79
	289	Storage	5	39	27	0.456	0.68	6	0.444	0.83
	292A	Office	50	50	40	0.551	0.51	47	0.575	0.88
	292	Office	50	37	28	0.465	.51/.68*	33	0.5	0.79
	290	Lounges	15	79	61	0.715	0.51	23	0.604	0.69
	215	Office	50	50	77	0.563	0.51	40	0.49	0.69
	213/216	Office	50	67	23	.55/.71	.48/.68*	24	0.711	0.79
	217	Office	50	46	56	0.536	0.51	45	0.48	0.79
	Cashier	Office	50	50	62	.38/.47	.68/.73*	44	.41/.5	.69/.79*
	Restroom	Toilet	20	51	65		.68/.73/.77*			

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
10-030	Conference	Conference	30	65	43	0.55	0.68	30	0.588	0.79
	Ent Hall	Corridor	10	38	22	0.617	0.63	14	0.688	0.64
	File Rm 1	Office	50	49	43	0.54	0.63	35	0.644	0.79
	Storage	Storage	5	78	32	0.531	0.63	26	0.592	0.64
	Office 1	Office	50	71	42	0.494	0.63	35	0.588	0.79
	Open Office 1	Office	50	52	41	0.644	0.63	43	0.644	0.64
	Office 2	Office	50	58	43		0.63	42		0.69
	Office 2,3,4,5,6	Office	50	91	43	0.468	0.63	42	0.499	0.69
	Breakroom	Lounge	15		18	0.629	0.63	20	0.629	0.64
	Restroom	Toilet	20	56	40	0.535	0.73	17	0.525	0.73
	Janitor Rm	Janitorial Clst.	5	63	56	0.095	0.68	15	0.11	0.68
	Office 7	Office	50	43	27	0.526	0.68	35	0.613	0.79
	Office 8	Office	50	53	52	0.425	0.63	50	0.453	0.69
	E Entrance 1	Corridor	10	65	22	0.307	0.68	22	0.307	0.64
	Hallway	Corridor	10	64	18	0.648	0.63	17	0.648	0.64
	Restroom	Toilet	20	21	12	0.338	0.68	14	0.436	0.69
	Office 9	Office	50	52	18	0.581	0.63	17	0.696	0.64/79*
	Open Office 2	Office	50	81	60	0.622	0.68	43	0.794	0.79
	Computer Rm	Computer Rm	50	71	50	0.423	0.68	41	0.479	0.69
	S Entrance			101	57	0.39	0.68	14	0.412	0.68

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
10-050	Foyer	Corridor	10	76	47	0.572	0.68	17	0.741	0.84
	Office 1	Office	50	73	47	0.572	0.68	35	0.741	0.84
	Bay 1	Garage	5	27		0.465	0.67			
	Bay 2	Garage	5	19		0.54	0.68			
	Office 2	Office	50	66	47	0.572	0.68	35	0.741	0.84
	Hallway	Corridor	10	39	34	0.555	0.73	31	0.564	0.66
	Dining	Cafeteria	25	24		0.795	0.72/78*			
	Kitchen	Kitchen	70	40	46	0.546	0.68	68	0.637	0.84
	Lounge	Lounge	15		23	0.652	0.73	21	0.666	0.66
	Exercise			44	29	0.652	0.73	26	0.666	0.66
	Laundry			45	27	0.538	0.73	25	0.547	0.66
	Sleeping Area			27	10	0.359	0.73/76*	9	0.359	0.66/76*
	TV Room	Lounge	15		54	0.53	0.68	27	0.606	0.66
	Office 3	Office	50	59	50	0.48	0.68	36	0.617	0.84
	Ladies Rm	Toilet	20	54	49	0.381	0.68	24	0.431	0.66
	Bay 3	Garage	5	20		0.412	0.67			

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
13-010	Offices	Office	50	55	62	0.379	0.68	43	0.484	0.81
	Restroom	Toilet	20	20		0.375	.60/.75*			
	Training Room	Office	50	53	76	0.48	0.68	41	0.538	0.7
	Hallway	Corridor	10		19	0.315	0.68	21	0.327	0.7

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
13-020	Waiting Room	Lobby	15	56	27	0.589	0.68	24	0.589	0.66
	Entrance Foyer	Corridor	10	34		0.435	0.73		0.435	0.7
	Recep Office	Office	50	48		0.389	0.73		0.389	0.7
	Records Office	Office	50	38		0.484	0.73		0.484	0.7
	Office 1	Office	50			0.518	0.73		0.655	0.81
	Womens Rm	Toilet	20	5		0.308	0.77			
	Mens Rm	Toilet	20			0.308	0.77			
	Doctors Office	Office	50	58		0.484	.68/.73*		0.55	0.81
	Exam Room	Office	50	50		0.461	0.73		0.587	0.81
	Patient Lobby	Lobby	15	22		0.362	0.68		0.362	0.66
	Hallway	Corridor	10	53		0.335	.68/.73/.77*		0.335	.66/.77*
	X-Ray Develop			13						
	X-Ray Reading			14						
	X-Ray	Office	50	66	49	0.437	0.68	38	0.564	0.9
	X-Ray Tech			20	29	0.348	0.58	30	0.388	0.81
	Waiting Room	Lobby	15	29	29	0.348	0.58	30	0.388	0.81
	Restroom	Toilet	20	6		0.064	0.77			
	Records Stg	Storage	5	25	23	0.42	0.73	21	0.42	0.7
	Hallway 2	Corridor	10	35	32	0.388	0.58	20	0.391	0.66
	Scrub Room	Office	50	51	68	0.353	0.68	53	0.454	0.9
	Operating Rm			62	67	0.49	0.68	63	0.49	0.69
	Medicine Stg		50	98	87	0.367	0.68	69	0.473	0.9
	Ambulance Ent	Corridor	10		14	0.276	0.68	13	0.276	0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
13-030	Operations	Office	50	89	61	0.454	0.68	44	0.586	0.81
	Clerks Room	Office	50	14	33	0.402	0.68	29	0.402	0.66
	Commander Off	Office	50	49	34	0.39	0.68	30	0.39	0.66
	Security Room	Office	50	20	17	0.36	0.68	15	0.36	0.66
	SR Supervisor	Office	50	39	37	0.376	0.68	33	0.376	0.66
	Pubs. Room	Office	50	35	37	0.376	0.68	33	0.376	0.66
	Latrine	Toilet	20	44	17	0.36	0.68	15	0.36	0.66
	Equip. Room	Storage	5	18	19	0.325	0.68	17	0.325	0.66
	Laundry				19	0.325	0.68	17	0.325	0.66
	Maint Office	Office	50	59	37	0.376	0.68	33	0.376	0.66
	Supply Storage	Storage	5	11	17	0.36	0.68	15	0.36	0.66
	Supply Office	Office	50	25	37	0.376	0.68	33	0.376	0.66
	Dressing Room	Lounge	15		17	0.36	0.68	26	0.484	0.81
	Classroom	Conference	30	47	52	0.487	0.68	47	0.487	0.66
	Classroom Off	Office	50	54	32	0.397	0.68	29	0.397	0.66
	Kitchen	Kitchen	70	43	33	0.489	0.68	30	0.489	0.66
	Work Room	Office	50	18	20	0.327	0.68	30	0.439	0.81
	Tool Room	Storage	5	18	25	0.124	0.68	22	0.124	0.66
	Latrine	Toilet	20		7	0.057	0.77			
	Hallway	Corridor	10	48	20	0.352	0.68	14	0.452	0.81

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
13-040	1	Office	50	44	38	0.431	0.68	34	0.431	0.66
	2	Lounge	15	44	30	0.47	0.68	27	0.47	0.66
	3	Office	50	53	38	0.631	0.71	35	0.631	0.69
	4	Office	50	52	47	0.465	0.71	43	0.465	0.69
	5	Office	50	64	47	0.465	0.71	43	0.465	0.69
	6	Storage	5		47	0.527	0.71	43	0.527	0.69
	7	Office	50	53	32	0.514	.71/.82*	29	0.514	.50/.69*
	8	Office	50	66	49	0.527	0.71	45	0.527	0.69
	9	Lounge	15	89	52	0.527	0.71	31	0.527	0.69
	Mens Rm	Toilet	20	63	19	0.433	0.71		0.433	0.69
	Womens Rm	Toilet	20		32	0.145	0.71	29	0.145	0.69
	Hallway	Corridor	10	43	45	0.375	0.71	19	0.375	0.69

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
13-060	TV Room	Lounge	15	28	16	0.308	0.68			
	Supervisor Off	Office	50	60	54	0.388	0.68	47	0.592	0.81
	Eye Exam	Office	50	60	60	0.407	0.68	52	0.622	0.81
	Restroom 1	Toilet	20	39	47	0.328	0.68	28	0.436	0.66
	Stg Room 1	Storage	5		46	0.328	0.68	28	0.436	0.66
	Office 1	Office	50	86	84	0.378	0.68	51	0.503	0.66
	Office 2	Office	50	85	71	0.359	0.68	43	0.477	0.66
	Recept Room	Office	50	74	84	0.378	0.68	51	0.503	0.66
	Hallway	Corridor	10	56	61	0.371	0.68	16	0.493	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
13-080	Lab Area 1			62	47	0.595	.58/.81*	42	0.578	0.66
	Lab Area 2			56	45	0.502	0.58	33	0.498	0.66
	Storage	Storage	5		10	0.275	0.81			
	Urinalysis			54	49	0.368	0.58	42	0.407	0.66
	Vini-Puncture			88	71	0.367	0.68	64	0.367	0.66
	Office	Office	50	38	41	0.428	0.58	34	0.463	0.66
	Womens Rm	Toilet	20	22	18	0.073	0.82	19	0.076	0.5
	Mens Rm	Toilet	20	10	18	0.073	0.82	19	0.076	0.5

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
13-100	Waiting Rm	Lobby	15	22	28	0.602	0.68	30	0.602	0.66
	Pharmacy			50	41	0.446	0.68	44	0.446	0.66
	Pharm Office	Office	50	52	41	0.355	0.68	43	0.355	0.66
	Storage 1	Storage	5	40	35	0.392	0.68	18	0.421	0.66
	Hallway	Corridor	10		15	0.325	0.68	16	0.325	0.66
	Pharmacy Stg	Storage	5	10	7	0.282	0.76			
	Storage 2	Storage	5	57	43	0.459	0.68	27	0.496	0.66
	Restroom	Toilet	20	16	7	0.289	0.76			
	Mech Room	Mechanical	15	27	22	0.337	0.68	24	0.337	0.66
	Dental Rm 2			24	16	0.431	0.68			
	Dental Rm 1			20	29	0.431	0.68			
	Dental Stg	Storage	5	22	20	0.379	0.68			
	X-Ray			34	20	0.379	0.68			

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
13-110	Restroom	Toilet	20	12				
	Open Area 1	Office	50	120	75	.739/.657	45	.739/.657
								.50/.66*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
16-210	Hallway	Corridor	10	43	24	0.448	15	0.457
	Kitchen	Kitchen	70	43	25	0.506	22	0.506
	Latrine&Laun	Toilet	20	35	18		16	
	2nd Floor Hall	Corridor	10	45	28	0.446	13	0.41
	Latrine 2	Toilet	20		18	0.48	16	0.376
						.60/.68*		.58/.66*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
31-010	Calibration Lb			99	78	0.497	71	0.497
								0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
31-080	Foyer	Corridor	10	52	22	0.51	16	0.568
	Restroom	Toilet	20	32	13	0.485	14	0.485
	Breakroom	Lounge	15	78	60	0.466	36	0.494
	TMDE Storage	Storage	5	58	47	0.505	53	0.505
	Lab			60	66	0.632	68	0.632
	Office	Office	50	86	56	0.478	34	0.506
	Computer	Computer	50	46	42	0.436	68	0.462
						0.63		0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-030	Tire Shop			65	21	0.704	29	0.642
								0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	LLF	Avg Calc FC	LLF
32-035	Motor Pool			30	50	0.714	45	0.714
						0.68		0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	CU	Avg Calc FC	CU
13-110	Restroom	Toilet	20	12				
	Open Area 1	Office	50	120	75	.739/.657	45	.739/.657
								.50/.66*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	CU	Avg Calc FC	CU
16-210	Hallway	Corridor	10	43	24	0.448	15	0.457
	Kitchen	Kitchen	70	43	25	0.506	22	0.506
	Latrine&Laun	Toilet	20	35	18	0.68	16	0.66
	2nd Floor Hall	Corridor	10	45	28	0.446	13	0.41
	Latrine 2	Toilet	20		18	0.48	16	0.376
						.60/.68*		.58/.66*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	CU	Avg Calc FC	CU
31-010	Calibration Lb			99	78	0.497	71	0.497
								0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	CU	Avg Calc FC	CU
31-080	Foyer	Corridor	10	52	22	0.51	16	0.568
	Restroom	Toilet	20	32	13	0.485	14	0.485
	Breakroom	Lounge	15	78	60	0.466	36	0.494
	TMDE Storage	Storage	5	58	47	0.505	53	0.505
	Lab		60	66	66	0.632	68	0.632
	Office	Office	50	86	56	0.478	34	0.506
	Computer	Computer	50	46	42	0.436	68	0.462
								0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	CU	Avg Calc FC	CU
32-030	Tire Shop			65	21	0.704	29	0.642
								0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		Proposed	
					Avg Calc FC	CU	Avg Calc FC	CU
32-035	Motor Pool			30	50	0.714	45	0.714
								0.66

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
32-060	Compress Rm	Mechanical	15	54	19	0.348	0.72	17	0.348	0.7
	Boiler Room	Mechanical	15		3	0.488	.68/.76*	3	0.488	.66/.76*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
32-070	Laundry			55	57	0.657	0.69	56	0.657	0.66
	Incpreg Area				47	0.658	0.69	46	0.658	0.66
	Breakroom	Lounge	15	36	63	0.541	0.69	40	0.541	0.66
	Mens Rm	Toilet	20	6	20	0.541	0.69	19	0.541	0.66
	Ladies Rm	Toilet	20	6	20	0.541	0.69	19	0.541	0.66
	Office	Office	50	44	25	0.473	0.68	23	0.473	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
32-090	1	Office	50	28	73	0.506	0.68	42	0.653	0.66
	2	Corridor	10		30	0.366	0.68	18	0.504	0.66
	3						0.68			
	4	Toilet	20	86	58	0.096	0.68	35	0.129	0.66
	5	Toilet	20	86	58	0.096	0.68	35	0.129	0.66
	6	Office	50	106	83	0.524	0.68	50	0.715	0.66
	7	Office	50	43	19	0.435	0.68	22	0.58	0.67
	8	Storage	5	60	40	0.414	0.68	33	0.631	0.81
	9	Office	50	104	33	0.512	0.68	42	0.783	0.81
	10	Lounge	15	89	39	0.557	0.68	23	0.756	0.66
	11	Office	50	53	48	0.461	0.68	42	0.704	0.81
	12	Office	50	35	40	0.535	0.68	35	0.82	0.81
	13	Conf Room	30	91	86	0.556	0.68	39	0.608	0.66
	14	Storage	5		25	0.532	0.78			
	15	Storage	5		25		0.78			
	16	Toilet	20	83	30	0.435	0.68	19	0.597	0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
32-100	Office 1	Office	50	76	59	0.543	0.68	44	0.612	0.66
	Office 2	Office	50	87	59	0.462	0.68	34	0.592	0.66
	Break Room	Lounge	15	32	41	0.526	0.68	21	0.607	0.66
	Restroom	Toilet	20	26	32	0.482	0.73	29	0.482	0.7
	Ent/Hall	Corridor	10	19	34	0.402	0.68	30	0.402	0.66
	Storage 1	Storage	5	39	25	0.475	0.68	23	0.475	0.66
	Lab			100	106	0.671	0.68	54	0.744	0.66
	Hallway	Corridor	10	73	52	0.493	0.68	10	0.547	0.66
	Electr. Testing			67	53	0.481	0.68	50	0.505	0.66
	Storage 2	Storage	5	33	26	0.453	0.68	23	0.453	0.66
	Training Area			58	65	0.539	0.68	33	0.622	0.66
	Rebuild Shop			120	74	0.636	.67/.68*	46	0.636	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
32-130	Lab			87	95	0.75	0.68	52	0.801	0.66
	Sub Lab			124	67	0.729	0.68	37	0.779	0.66
	Restrooms	Toilet	20	22	24	0.491	0.6	15	0.281	0.5
	Storage	Storage	5	10	37	0.415	0.68	18	0.415	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
32-150	Offices	Office	50	39		0.537	0.68		0.537	0.66
	Restrooms	Toilet	20	42		0.322	0.68		0.322	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
33-060	Compress Rm	Mechanical	15	54	19	0.348	0.72	17	0.348	0.72
	Boiler Room	Mechanical	15		3	0.488	.68/.76*	3	0.488	.68/.76*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
33-530	North End			38	39	0.623	.53/.78*	28	0.581	0.66
	NE Corner			49	38	0.415	0.78	29	0.564	0.66
	SW End			39	29	0.623	.53/.78*	30	0.581	0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
34-110	Packing			11	18	0.76	0.68	17	0.792	0.66
	Paint Shop			31	14	0.719	0.67	14	0.755	0.66
	Packing Office	Office	50	83	138	0.473	0.68	72	0.541	0.66
	Prep Room			9	10	0.721	0.68	10	0.751	0.66
	Prod Line 4			20	43	0.621	0.68	40	0.645	0.66
	Filing	Office	50	53	37	0.783	0.68	35	0.816	0.66
	Filing Office	Office	50	52	93	0.496	0.68	48	0.499	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
34-120	1	Office	50	36	50	0.611	0.63	45	0.724	0.66
	2	Office	50	25	41	0.442	0.63	37	0.523	0.66
	3	Corridor	10	37	41	0.386	0.58	17	0.345	0.66
	4	Office	50	36	64	0.707	0.58	48	0.679	0.66
	Storage	Storage	5	47	35	0.766	0.58	6	0.751	0.66
	Breakroom	Lounge	15	51	39	0.518	0.68	25	0.535	0.66
	Restroom 1	Toilet	20	67	21	0.585	0.68	20	0.603	0.66
	Restroom 2	Toilet	20	48	21	0.585	0.68	20	0.603	0.66
	Lab			44	50	0.583	0.68	53	0.583	0.66
	Office 3	Office	50	51	52	0.549	0.68	39	0.655	0.66
	Office 4	Office	50	32	90	0.454	0.63	42	0.488	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
34-140	Office	Office	50	61	55	0.541	0.67	48	0.541	0.66
	Water Ch Tst			47	41	0.385	0.68	38	0.364	0.66
	Boiler	Mechanical	15	29	22	0.334	.66/68.76*	20	0.334	.50/.66*
	Restroom	Toilet	20	23	20	0.395	0.68	21	0.395	0.66
	Compres Rm 1	Mechanical	15		26	0.566	0.66	26	0.475	0.66
	Compres Rm 2	Mechanical	15		26	0.566	0.66	26	0.475	0.66

• Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present		LLF	Proposed			
					Avg Calc FC	CU		Avg Calc FC	CU	LLF	
34-910	Locker Rm 1	Toilet	20	27	31	0.567	0.68	27	0.567	0.66	
	Toilet 1	Toilet	20	35	26	0.522	0.68	23	0.522	0.66	
	Locker Rm 2	Toilet	20	32	35	0.656	0.63	34	0.656	0.66	
	Toilet 2	Toilet	20	27	32	0.574	0.63	29	0.574	0.66	
	Paint Shop		31	31	17	0.332	.34/.68*	30	0.333	.34/.80*	
	Paint Office	Office	50	93	75	0.479	0.63	45	0.6	0.67	
	Sign Constr		107	120	120	0.614	0.63	64	0.794	0.67	
	Ent Office	Office	50	75	70	0.556	0.64	57	0.6	0.67	
	PM Conf Rm	Conference	30	67	74	0.427	0.68	51	0.587	0.61	
	PM Hallway	Corridor	10	75	67	0.334	0.63	24	0.461	0.61	
	PM Office 1	Office	50	87	70	0.34	0.63	45	0.468	0.61	
	PM Office 2	Office	50	97	68	0.34	0.68	43	0.468	0.61	
	PM Office 3	Office	50	77	70	0.339	0.68	45	0.468	0.61	
	WO Central	Office	50	42	48	0.538	0.68	44	0.538	0.67	
	WO Office 1	Office	50	35	37	0.401	0.68	37	0.436	0.61	
	WO Office 2	Office	50	35	37	0.401	0.68	37	0.436	0.61	
	WO Hallway	Corridor	10	37	32	0.143	0.68	28	0.561	0.66	
	WO Office 3	Office	50	43	50	0.526	0.68	50	0.564	0.61	
	WO Copy Rm			56	56	40	0.41	0.68	25		0.61
	WO Storage	Storage		5	32	22	0.396	0.74			
	WO BreakRm	Lounge		15	128	75	0.463	0.68	35	0.635	0.61
	WO Secr Area	Office		50	95	64	0.483	0.68	40	0.66	0.61
	WO Microfile	Office		50	34	44	0.511	0.68	35	0.55	0.61
	Micro Storage	Storage		5		28	0.422	0.68	17	0.46	0.61
	Utility Bkrm	Lounge		15	78	108	0.494	0.68	27	0.536	0.66
	Util Bkrm Kit	Kitchen		70	56	23	0.313	0.68	28	0.409	0.66
	Util Office	Office		50	53	28	0.352	0.68	36	0.458	0.66
	Womens Rm	Toilet		20	52	37	0.495	0.68	33	0.495	0.66
	DR Shower	Toilet		20	30						
	Hall DR 1	Corridor		10	25	17	0.148	0.64	12	0.145	0.86
	Maint Office	Office		50	92	68	0.54	0.68	32	0.588	0.7
	Refrig Shop			65	65	47	0.468	0.74	34	0.561	0.86
	Refrig Hall	Corridor		10	62	38	0.385	.68/.69/.70*	17	0.462	0.86
	ElecShpBkrm	Lounge		15	89	54	0.511	.67/.68*	27	0.53	0.66
ElecWrk Area			31	31	35	0.534	0.68	32	0.554	0.66	
Elec Office	Office		50	41	59	0.536	.68/.73*	40	0.556	0.66	
Elec Storage	Storage		5	43	54	0.421	0.73	26	0.485	0.66	
Elec Storage	Storage		5	31	54		0.73	26		0.66	
Locksmith			109	109	62	0.462	0.68	54	0.729	0.81	
Inst Shp Brk	Lounge		15	56	53	0.516	0.68	35	0.591	0.66	
Inst Wrk Area			44	44	54	0.516	0.68	51	0.694	0.81	
Inst Entrance	Corridor		10	50	42	0.55	0.68	28	0.633	0.66	
Inst Office	Office		50	115	67	0.432	0.68	44	0.593	0.69	
Wash Area	Toilet		20	43	48	0.448	0.68	25	0.511	0.66	
Mill Ent	Corridor		10	102	62	0.565	0.69	25	0.565	0.66	
Mill Office	Office		50	55	77	0.456	0.68	40	0.52	0.66	
Mill Shop			35	35	55	0.603	.67/.68*	34	0.586	0.81	
T&D BreakRm	Lounge		15	52	51	0.524	0.68	34	0.714	0.69	
T&D Shop											
BGU Comp	Computer		50	38	42	0.523	0.65	38	0.55	0.83	
BGU BrkRm	Lounge		15	148	87	0.486	0.68	26	0.527	0.66	
BGU Office 1	Office		50	63	49	0.388	0.65	54	0.407	0.83	
BGU Office 2	Office		50	78	78	0.405	0.65	56	0.443	0.83	
BGU Ent	Corridor		10	35	33	0.294	0.68	18	0.331	0.69	
BGU Kitchen	Kitchen		70	45	30	0.385	0.68	17	0.476	0.66	

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
34-970	1	Office	50	71	107	0.395	0.68	50	0.544	0.66
	3	Office	50	90	109	0.402	0.68	50	0.554	0.66
	4	Office	50	60	104	0.387	0.68	60	0.533	0.66
		Dir Eng	50	66	77	0.59	0.68	38	0.625	0.66
		Admin Office	50		69	0.446	0.68	43	0.612	0.66
		Conf Room	30	51	79	0.456	0.68	38	0.625	0.66
		File Room	50	57	58	0.378	0.68	19	0.521	0.66
		Copier Room		28	27	0.328	0.36	30	0.334	0.66
		Storage Room	5	30	30	0.345	0.68	26	0.345	0.66
		Womens Rm	20	32	36	0.304	0.68	19	0.311	0.66
		Alcove		75	59	0.128	0.68	57	0.131	0.66
		Mens Room	20	27	9	0.304	0.82	8	0.311	0.5
	Kitchen	Kitchen	70	60	23	0.485	0.68	23	0.519	0.66
	Hallway	Corridor	10	65	29	0.374	0.68	28	0.404	0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum			Present			Proposed		
			Maximum Req'd FC	Meas. FC		Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
44-100	Cafeteria	Cafeteria	25	28		49	0.719	0.68	32	0.816	0.66
	CafCook Area	Kitchen	70	72							
	Caf Office	Office	50	111		134	0.568	0.68	52	0.654	0.66
	Caf Conf	Conference	30	184		90	0.536	0.68	24	0.619	0.66
	Caf Office	Office	50	121		82	0.536	0.68	35	0.619	0.66
	Restrooms	Toilet	20			16	0.983	0.77	6	0.456	0.5
	Caf Hall	Corridor	10			16	0.983	0.77	6	0.456	0.5
	Eng Office	Office	50	60		64	0.372	0.68	38	0.471	0.69
	PM Office	Office	50	43		64	0.372	0.68	38	0.471	0.69
	Admin Office	Office	50	75		75	0.535	0.68	39	0.619	0.66
	Dir Office	Office	50	82		79	0.444	0.68	41	0.517	0.66
	Coffee Room	Lounge	15	75		53	0.403	0.68	28	0.47	0.66
	CAD Office	Office	50	68		59	0.38	0.68	31	0.445	0.66
	Office 1	Office	50	91		75	0.4	0.68	44	0.508	0.69
	Stats Office	Office	50	61		67	0.363	0.68	35	0.425	0.66
	Office 2	Office	50	65		67	0.363	0.68	35	0.425	0.66
	Office Hall	Corridor	10	50		56	0.265	0.68	29	0.312	0.66
	Main Hall	Corridor	10	36		5	0.754	.68/.77*	4	0.768	.50/.66*
	Main Office	Office	50	66		38	0.642	0.68	41	0.736	0.69
	Office 3	Office	50	71		73	0.544	0.68	37	0.627	0.66
	Mens Locker	Toilet	20	33		26	0.758	0.68	24	0.771	0.66
	Shower Area	Toilet	20	64		30	0.665	.60/.68*	22	0.681	.58/.66*
	LockerRm-Old	Toilet	20	36		43	0.788	0.68	39	0.8	0.66
	Locker Hall	Corridor	10			27	0.61	.73/.77*	12	0.519	0.66
	Mens Room	Toilet	20	80		37	0.768	0.73	18	0.627	0.66
	Mens Shower	Toilet	20	40		23	0.459	0.68	20	0.459	0.66
	Women Locker	Toilet	20	48		64	0.288	0.68	41	0.288	0.66
	WomShower 1	Toilet	20	10		13	0.188	0.73	18	0.446	0.66
	WomShower 2	Toilet	20	12		10	0.196	0.39	13	0.464	.50/.66*
	Wom Bath Lng	Lounge	15	50		24	0.597	0.68	22	0.615	0.66
	WomensRm	Toilet	20	46		17	0.641	0.73	16	0.541	0.66
	Supply Storag	Storage	5	40		46	0.656	0.68	42	0.672	0.66
	Supp Filing	Office	50	71		54	0.691	0.68	28	0.79	0.66
	Supp Office	Office	50	32		49	0.677	0.68	39	0.693	0.66
	Supp Office	Office	50	76		49		0.68	39		0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
51-420	34	Lounge	15	90	83	0.458	0.68	27	0.627	0.66
	35	Conference	30	48	77	0.422	0.68	49	0.58	0.66
	33	Office	50	46	68	0.435	0.68	43	0.597	0.66
	31	Office	50	53	97	0.441	0.68	43	0.605	0.66
	29	Office	50	117	83	0.414	0.68	53	0.57	0.66
	32	Toilet	20	73	34	0.448	.60/.68*	21	0.448	.58/.66*
	30	Toilet	20	73	21	0.448	.60/.68*	14	0.448	.58/.66*
	Hall 1	Corridor	10	15						
	27	Office	50	71	70	0.435	0.68	45	0.597	0.66
	25	Office	50	117	77	0.429	0.68	48	0.589	0.66
	23	Office	50	61	69	0.441	0.68	43	0.605	0.66
	21	Office	50	75	70	0.435	0.68	45	0.597	0.66
	22	Office	50		77	0.429	0.68	48	0.748	0.66
	20/24	Storage	5	205	96	0.395	0.68	45	0.544	0.66
	26	Office	50	198	84	0.422	0.68	51	0.58	0.66
	28	Office	50	89	61	0.45	0.68	39	0.617	0.66
	Mens Room	Toilet	20	75	91	0.409	0.68	30	0.562	0.66
	Womens Rm	Toilet	20	70	37	0.447	.60/.68*	21	0.614	.58/.66*
	7	Office	50	21	23	0.507	0.34	30	0.539	0.66
	Hallway 2	Corridor	10							
	5	Office	50	105	82	0.458	0.68	52	0.627	0.66
	3	Office	50	96	82	0.454	0.68	36	0.622	0.66
	1	Office	50	104	82	0.458	0.68	53	0.627	0.66
	2	Office	50	25	39	0.422	0.68	25	0.58	0.66
	4	Office	50	118	83	0.454	0.68	36	0.622	0.66
	6	Office	50	128	69	0.435	0.68	44	0.597	0.66
	8	Office	50	94	69	0.435	0.68	44	0.597	0.66
	10	Office	50		69	0.435	0.68	44	0.597	0.66
	9	Office	50	84	39	0.422	0.68	25	0.58	0.66
	12	Office	50	81	61	0.45	0.68	39	0.617	0.66
	11	Office	50	70	62	0.446	0.68	39	0.611	0.66
	14	Conference	30	94	62	0.476	0.68	39	0.652	0.66
	13	Office	50	85	56	0.458	0.68	36	0.627	0.66
	Comp. Room	Computer	50							

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
51-430	Office 1	Office	50	86	102	0.473	0.68	54	0.647	0.66
	Off 1 Shop			89	62	0.452	0.72	55	0.452	0.7
	Restrooms	Toilet	20		15	0.079	0.82	10	0.069	0.5
	Office 2	Office	50	42						
	Office 3	Office	50	52	43	0.432	0.68	29	0.593	0.66
	Off3 RestRm	Toilet	20		13	0.304	0.81	12	0.287	0.5

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
53-160	Main Area	Office	50	89	57	0.554	0.68	34	0.753	0.66
	Office 1	Office	50	92						
	Office 2	Office	50	82						
	Office 3	Office	50	84	52	0.463	0.68	36	0.707	0.69
	Break Room	Lounge	15	33	44	0.588	0.68	42	0.623	0.66
	WmnsClot Ret			17						
	Womens Rm	Toilet	20	25	30	0.397	.60/.68*	26	0.475	.58/.64*
	Womens Lckr	Toilet	20	27	26	0.456	.68/.76/.81/.82*	21	0.547	.50/.64/.66*
	Janitor	Janitor	5	22						
	Office 4	Office	50							
	Store Room	Storage	5	39	50	0.304	0.68	30	0.419	0.66
	Alcove 1			41						
	MensClotRet			45						
	Mens Room	Toilet	20	61	30	0.397	.60/.68*	26	0.475	.58/.64*
	Mens Locker	Toilet	20	37	48	0.468	.60/.68/.81*	30	0.641	.50/.58/.64/.66*
	Com RestRm	Toilet	20							
	Hallway	Corridor	10	67	24	0.325	0.68	14	0.449	0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
60-020	Provost	Office	50	34	48	0.521	0.58	44	0.512	0.69
	Security Spec	Office	50	48	47	0.521	0.58	44	0.512	0.69
	103	Office	50	27	41	0.458	0.58	54	0.428	0.69
	105	Office	50	39	38	0.531	0.68	47	0.567	0.69
	105a	Office	50	24	20	0.442	0.58	36	0.471	0.69
	107	Office	50	13	16	0.515	0.58	28	0.536	0.69
	102	Office	50	32	24	0.559	0.58	44	0.575	0.69
	104	Office	50	31	30	0.458	0.58	34	0.492	0.69
	Break Room	Lounge	15	15	15	0.528	0.58	23	0.512	0.69
	Mens Room	Toilet	20	23	11	0.559	0.68	12	0.559	0.69
	Womens Rm	Toilet	20	11	11	0.559	0.68	12	0.559	0.69
	Hallways	Corridors	10	80	5	0.725	.68/.76*	2	0.807	.69/.76*
	Training			30	26	0.521	0.68	24	0.638	0.66
	LockerRm 1	Toilet	20	37	40	0.509	0.68	21	0.589	0.66
	Foyer			27	38	0.342	0.68	36	0.357	0.66
	109			70	41	0.542	0.58	34	0.567	0.66
	110	Office	50	56	53	0.474	0.68	41	0.536	0.66
	Radio Room	Office	50	27	80	0.431	0.68	47	0.5	0.66
	LockerRm 2	Toilet	20	23	58	0.558	0.68	30	0.643	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
60-060	Break Rm	Lounge	15	85	56	0.494	0.68	35	0.676	0.66
	Hallway	Corridor	10	53	33	0.32	0.68	29	0.32	0.66
	Mens Rm	Toilet	20	20	54	0.282	.68/.81*	35	0.388	.50/.66*
	Womens Rm	Toilet	20	59	39	0.306	.60/.68*	33	0.306	.58/.66*
	Janitor	Janitor	5	10	11	0.079	0.81	10	0.069	0.5
	6	Office	50	67	53	0.39	0.68	39	0.593	0.69
	Open Office	Office	50	67	63	0.511	0.68	48	0.783	0.69
	5	Office	50	7	46	0.416	0.68	34	0.634	0.69
	6	Office	50	66	45	0.416	0.68	33	0.634	0.69
	Storage	Storage	5	24	28	0.424	0.68	25	0.424	0.66
	3	Office	50	61	58	0.456	0.68	43	0.696	0.69
	Open Area 1	Office	50	84	59	0.507	0.68	44	0.776	0.69
	2	Office	50	76	57	0.419	0.68	42	0.638	0.69
	1	Office	50	102	57	0.456	0.68	42	0.696	0.69
	EntHall&Alcov	Corridor	10	53	21	0.403	.68/.81*	18	0.403	.50/.66*

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
60-070	Cotton Storage	Storage	5	102	101	0.338	.67/.68*	47	0.471	0.66
	Office	Office	50	19	12	0.252	0.68	37	0.349	0.66
	Shower	Toilet	20	50	27	0.367	0.68	24	0.367	0.66
	Mens Locker	Toilet	20	35	12	0.271	0.68	25	0.377	0.66
	Womens Shwr	Toilet	20	50						
	Hallway	Corridor	10		8	0.217	0.68	12	0.303	0.66
	Mens Rm	Toilet	20	25	31	0.331	0.68	25	0.46	0.66
	Repair Stn			21	37	0.378	.67/.68/.69*	29	0.378	0.66
	Control Rm				4	0.59	0.68	4	0.59	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
60-090	Office 1	Office	50	55	56	0.625	0.51	46	0.699	0.73
	Main Office	Office	50	55	56	0.625	0.51	46	0.699	0.73
	Entrance	Corridor	10	69	42	0.428	0.51	22	0.463	0.66
	Office 2	Office	50	37	49	0.438	0.51	41	0.497	0.73
	File Area	Office	50	50	40	0.536	0.51	47	0.576	0.63
	Office 3	Office	50	38	42	0.4	0.51	35	0.455	0.73
	Kitchen	Kitchen	70	54	47	0.38	0.51	35	0.414	0.66
	Hallway	Corridor	10	57	42	0.428	0.51	22	0.463	0.66
	Womens Rm	Toilet	20	50	5	0.077	.73/.75*	7	0.103	.50/.63*
	Mens Rm	Toilet	20	21	6	0.071	.73/.75*	7	0.095	.50/.63*

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
60-630	Warehouse			6	13	0.803	0.71			
	Shipping Pred			8	11	0.591	0.73	27	0.537	0.66
	Break Room	Lounge	15	50	43	0.427	0.68	27	0.587	0.66
	Womens Rm	Toilet	20	35	14	0.403	0.68	13	0.403	0.66
	Mens Rm	Toilet	20	35	17	0.414	.68/.82*	14	0.414	.50/.66*
	Mens Showers	Toilet	20	3		0.414	0.414		0.414	
	Storage Rm	Storage	5	13	15	0.283	0.68	14	0.283	0.66
	Office	Office	50	42	34	0.391	0.68	31	0.391	0.66

• Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
63-100	Office 1	Office	50	45	83	0.557	.68/69*	58	0.578	0.66
	Womens Rm	Toilet	20	37	36	0.384	0.68	33	0.397	0.66
	Office 2	Office	50	72	56	0.394	0.68	36	0.458	0.81
	Mask-SuitDist		32	32	51	0.56	0.68	30	0.761	0.66
	Training Rm		29	29						
	Hall 1	Corridor	10	45	61	0.334	0.68	15	0.346	0.66
	Mens Rm	Toilet	20	47	27	0.456	0.68	13	0.472	0.66
	Change Rm	Toilet	20	37	44	0.503	0.68	40	0.522	0.66
	Hall 2	Corridor	10	20	47	0.456	0.68	17	0.473	0.66
	Break Rm	Lounge	15	18	30	0.743	0.69	25	0.743	0.66
	Storage Area	Storage	5	47	30	0.743	0.69	25	0.743	0.66
	Clean Rm			112	94	0.807	.67/69*	70	0.807	0.66

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
63-110	Layout 1			37	45	0.599	0.68	31	0.81	.70/74*
	Layout 2			62	42	0.805	0.67	21	0.796	0.69
	Testing			40						
	Bonding			47	51	0.47	0.68	48	0.628	0.7
	Storage A	Storage	5	58	59	0.47	0.68	15	0.509	0.7
	Smoke Break	Lounge	15	39	74	0.406	0.68	37	0.559	0.74
	Break Rm	Lounge	15	49	45	0.458	0.68	22	0.627	0.74
	2 Bathrooms	Toilets	20	20	21	0.469	0.68	18	0.469	0.7
	Storage B	Storage	5	48	42	0.436	0.68	21	0.436	0.7
	Office	Office	50	89	72	0.353	0.68	46	0.486	0.74

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
63-120	Loading Area 1			10	14	0.733	.53/69*	14	0.733	.53/69*
	Restroom 1	Toilet	20	30	25	0.437	0.68	22	0.437	0.66
	Restrm2/Chng	Toilet	20	80		0.609			0.609	
	Machine Shp		30	30						
	Radioactive stg		56	56	69	0.361	0.68	24	0.497	0.66
	Office	Office	50	30	54	0.39	0.68	37	0.537	0.66
	ToolRm Office	Office	50		15	0.549	0.68	15	0.57	0.73
	Break Rm	Lounge	15	42	40	0.434	0.68	24	0.596	0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
63-200	Main Area	Office	50	112	40	0.607	0.68	44	0.795	.67/.69*
	Break Rm	Lounge	15	34	55	0.543	0.68	33	0.738	0.66
	Mens Rm	Toilet	20	44						
	Womens Rm	Toilet	20	44						
	Mask Insp			48						
	Storage Rm	Storage	5	20	38	0.46	0.68	36	0.494	0.66
	Office 1	Office	50	35	31	0.516	0.68	30	0.55	0.66
	Office 2	Office	50	49	37	0.6	0.68	35	0.635	0.66
	Tool Rm			43						

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
63-210	Main Area	Office	50	122	59	0.891	0.69	44	0.891	0.66
	M43 Test Prep			40	53	0.715	0.68	48	0.729	0.66
	Storage Rms	Storage	5	31	15	0.603	0.69	15	0.603	0.66
	Drying Rm				4	0.333	0.76			
	Break Rm	Lounge	15	48	28	0.722	.68/.76*	26	0.736	.66/.76*
	Office1	Office	50	45	35	0.672	0.68	32	0.688	0.66

* Multiple Fixtures Used

Pine Bluff Arsenal Bldg Summary

Bldg.	Room	AEI Classification	Maximum Req'd FC	Maximum Meas. FC	Present			Proposed		
					Avg Calc FC	CU	LLF	Avg Calc FC	CU	LLF
63-410	Entrance				5	0.166	0.68	11	0.462	0.72
	Alcove			13	7	0.038	0.68	13	0.158	0.72
	Locker Rm 1	Toilet	20	40	23	0.624	.60/.68*	22	0.655	.60/.72*
	Shower 1	Toilet	20	14	14	0.535	0.68	13	0.535	0.67
	Locker Rm 2	Toilet	20	26	16	0.47	.60/.68*	15	0.478	.60/.72*
	Alcove 2			20						
	Rest Rm 1	Toilet	20	30	23	0.379	.60/.68*	14	0.38	.60/.66*
	Shower 2	Toilet	20	14	15	0.472	0.68	14	0.472	0.69
	Alcove 3			6						
	Alcove 4			6	7	0.081	0.62			
	Alcove 5			5	8	0.049	0.62			
	Alcove 6			9	8	0.049	0.68			
	Open Ape			28	9	0.548	.60/.68*	12	0.553	.60/.67*
	Rest Rm 2	Toilet	20	26	9	0.548	.60/.68*	12	0.553	.60/.67*
	Alcove 7			26	16	0.166	0.68	14	0.191	0.72
	Hallway 1	Corridor	10	18	10	0.322	0.68	9	0.324	0.67
	Office 1	Office	50	23	22	0.468	.60/.68*	38	0.411	.60/.66*
	Kitchen	Kitchen	70	25	22	0.468	.60/.68*	38	0.411	.60/.66*
	Break Rm	Lounge	15	22	20	0.631	0.68	26	0.544	0.66
	Office 3	Office	50	22	8	0.183	0.68	33	0.444	0.66
	Office 4	Office	50	35	8	0.183	0.68	33	0.444	0.66
	Rest Rm 3	Toilet	20	32	18	0.474	.60/.62/.72*	17	0.483	.60/.62/.72*
	Alcove 8			7						
	Hallway 2	Corridor	10	20	10	0.433	.62/.68*	9	0.437	.62/.67*
	Rest Rm 4	Toilet	20	20	10	0.146	.60/.68*	18	0.395	.60/.72*
	Alcove(WRR)			10	9	0.089	0.62			
	Entrance 2			15	4	0.137	0.68	9	0.365	0.67
	Alcove 9				7	0.078	0.62			
	Lutance Room			35	19	0.63	.60/.68*	19	0.664	.60/.72*
	Showers	Toilet	20	15	12	0.541	.62/.68*	11	0.541	.62/.67*
	Alcove 10			5	9	0.25	0.62			
	Open Area 2			32	17	0.451	0.68	15	0.458	0.72
	Rest Rm 5	Toilet	20	33	20	0.379	0.68	17	0.38	.58/.72*
	Alcove 11			7						
	WmnsLckr Rm	Toilet	20	21	18	0.584	.60/.68*	17	0.608	.58/.72*
	Wmns Showrs	Toilet	20	13	13	0.533	0.68	12	0.533	0.66
	Rest Rm 6	Toilet	20	17	19	0.402	.60/.68*	17	0.387	.58/.72*
	Alcove 12				10	0.375	0.68	10	0.376	0.72
	Alcove 13				8	0.094	0.62			
	Ice Mach Rm			25	8	0.407	.62/.68*	18	0.41	.62/.72*
	Cithng Issue			24	12	0.172	0.68	27	0.482	0.72
	Mask Storage	Storage		14	22	0.514	0.68	21	0.527	0.72

COMMENTS
DOCUMENTATION CHECKLIST

ITEM	COMMENT
E-6	<p>Standard ballasts to be removed may contain PCBs, especially if manufactured before 1978. To meet federal hazardous waste disposal requirements, PCB-containing ballasts must be sealed in EPA-approved drums and either sent to approved storage sites or incinerated.</p> <p>Ballasts that are removed and are in good working order, and do not contain PCBs are to be placed in box containers and returned to Pine Bluff Arsenal.</p> <p>Lamps that are removed and are in good working order are to be placed in box containers and returned to Pine Bluff Arsenal.</p> <p>Disposal of lamps that are removed and that are not in good working order must be coordinated with Pine Bluff Arsenal, Environmental Compliance.</p>

COMMENTS
TECHNICAL DATA CHECKLIST

ITEM	COMMENT
E-1	<p>Standard ballasts to be removed may contain PCBs, especially if manufactured before 1978. To meet federal hazardous waste disposal requirements, PCB-containing ballasts must be sealed in EPA-approved drums and either sent to approved storage sites or incinerated.</p> <p>Ballasts that are removed and are in good working order, and that do not contain PCBs are to be placed in box containers and returned to Pine Bluff Arsenal.</p> <p>Lamps that are removed and are in good working order are to be placed in box containers and returned to Pine Bluff Arsenal.</p> <p>Disposal of lamps that are removed and that are not in good working order must be coordinated with Pine Bluff Arsenal, Environmental Compliance.</p>